SERVICE MANUAL

R200T
ELECTRONIC AIR PURIFIER

This manual provides reference information for servicing the Respiraide 200T.

WARNING:
RISK OF ELECTRIC SHOCK
This servicing manual is for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating manual unless you are qualified to do so.

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ENGLISH

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SDJP0809 R200 Ver.2.1

RespirAide®

PART I
GENERAL DESCRIPTION ON AIR CLEANING

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RespirAide®

PART I GENERAL DESCRIPTION ON AIR CLEANING

1. IN DOOR AIR QUALITY

If you could see the air you breathe under a microscope, you might be in for a surprise. The air quality is much more terrible than you may think. In fact, floating in indoor air is a "soup" of particles too small to be seen by your naked eye. But it is large enough to cause problems. Visible dust makes up only 1% of all the particles in the air. The vast majority of particles are microscopic.

How long the particles float in the air depends on their size. Relatively *"heavy"* dust particles (more than 5 microns) tend to settle out of the air in 20 minutes or less. They form the dust that's easily wiped away on tables and other surfaces. *Middleweight* particles (from 1 to 5 microns) may remain airborne for hours before falling out of the air. *Lightweight* particles (less than 1 micron) can remain suspended permanently in the air. And particles sized less than 1 micron can gain the easiest entry to your body and place the biggest burden on its defense system.

No matter the type or size of the building - single family home, office, school, store, hotel, restaurant, hospital, or other places - creating and maintaining good indoor air quality (IAQ) requires three key strategies: **source control**, **ventilation** and **air cleaning**. Indoor air is an intriguing, complex environment that contains a myriad of visible and invisible contaminants. These contaminants generally fall in one of two categories: particulates or gases, vapors and odors.

Particulates

Particulates are particles that are small enough to suspend in the air. Suspended inorganic particles, such as dust, pollen, fibers or smoke to name a few examples, are often referred to as aerosols. Suspended organic compounds and small living organisms, such as bacteria and viruses; mold spores and pieces of a mold colony; dust mites feces and body fragments; cockroach body parts; and dander from cats, dogs and other mammals, are called bio-aerosols. Particle size is measured in terms of its aerodynamic properties and is expressed as microns in diameter. Particles can range in size from very small, which can remain in the air for a long time, up to relatively large, which quickly settle out of calm air. Table 1 lists common indoor contaminants and their particle sizes.

Table 1. Particle Sizes of Common Indoor Contaminants

Particle	**Size** (micron)	**Particle**	**Size** (micron)
Skin flakes	1-40	Asbetos	0.25-1
Visible dust, lint	>25	Re-suspended dust	5-25
Dust mite	50	Environmental tobacco smoke	0.1-0.8
Mite allergen	5-10	Diesel soot	0.01-1
Mold, pollen spores	2-200	Outdoor fine particles (sulfates, metals)	0.1-2.5
Cat dander	1-3	Fresh combustion particles	<0.1
Bacteria	0.05-0.7	Metal fumes	<0.1
Viruses	<0.01-0.05	Ozone	<0.1
Amoeba	8-20	Mineral fibers	3-10

Inhaling particulates can cause eye, nose and throat irritation and increase the risk for respiratory infections. Health care professionals are especially concerned about the long-term effects of inhaling fine particles (less than 2.5 microns), because they can travel deep into the lungs where they can remain embedded for years or be absorbed into the bloodstream. Asbestos and various substances in environmental tobacco smoke (ETS) are well-known examples and some are recognized carcinogens. Exposure to high levels of fine particles also can play a role in developing respiratory diseases such as asthma, bronchitis, pneumonia and emphysema. Larger particles (greater than 10 microns) do not cause as much concern, because they get caught in the nose and throat and are cleared from the respiratory tract by coughing or swallowing.

Gases, Vapors and Odors

The types of gases or vapors most often found in indoor environments include combustion byproducts, such as carbon monoxide, nitrogen oxides, sulfur dioxide, soot particles and polycyclic aromatic hydrocarbons (PAHs); pet, human and cooking odors; ETS; volatile organic compounds (VOCs); microbial VOCs; and mycotoxins. Many of these substances also produce odors, some of which are pleasant while others can be distracting and irritating. Moisture also is a vapor that must be monitored as too much moisture can support indoor mold growth.

Volatile organic compounds are prevalent in all indoor environments, with as many as 100 to 1,000 different VOCs in the air where people can easily inhale them. Exposure to VOCs in offices and other business establishments can cause building occupants to feel uncomfortable, distracted or sick to the point that it interferes with their ability to do their work or reduces their motivation to work. Reducing the level of VOCs also is very important in homes and schools, because children breathe in more air with respect to their body mass than adults and thus have greater exposure to indoor air pollutants. Some types of mold also emit VOCs, known as microbial VOCs or MVOCs, which are responsible for the characteristic musty, earthy odors associated with mold. People who are sensitive to MVOCs may experience eye, nose and throat irritation.

A wide variety of molds also can produce mycotoxins at various times during their lifecycles. Building occupants can experience potentially serious health problems if they are exposed to high levels of these compounds, but this is rare in most indoor environments.
Although becoming a lesser issue in public buildings, ETS is still found in many homes, hotels, casinos, and in some restaurants and bars. Environmental tobacco smoke alone contains more than 4,700 airborne substances, including gases and particles from incompletely burned tobacco, of which 243 are known carcinogens.

Regardless of whether an indoor environment is the product of new construction or renovation, providing good indoor air quality starts during the design and construction phases and continues throughout a building's life, and, it is never too late to start managing IAQ in older buildings. Indoor environmental experts recommend three primary strategies for good IAQ, especially when integrated into a building's overall operation and maintenance. The following highlights each of these strategies: source control, ventilation and air cleaning.

Source control
The US Environmental Protection Agency (USEPA), the American Lung Association (ALA) and other experts agree that source control is the only completely effective way to remove pollutants from indoor environments. They also agree that total eradication of indoor air contaminants often is not feasible or practical. A more realistic goal is to use building materials, furnishings, finishes, office equipment, and cleaning products and processes that emit low levels of VOCs. Surface cleaning also removes larger particles and kills bacteria and viruses on floors, furniture, walls, doorknobs, bedding and linens, and bathroom fixtures. In addition, keeping the heating, ventilating and air-conditioning (HVAC) system in good working order and air ducts and drip pans clean is important for minimizing dust and particle accumulation and indoor mold growth within the system.
Source control also involves inspecting a building regularly inside and out for any signs of water damage, which is a good indicator that moisture levels are high enough to support indoor mold growth. The best way to prevent indoor mold growth is to eliminate all sources of excess moisture, from leaks in the building envelope, improper building pressurization, an inefficient or malfunctioning HVAC system, appliances to building occupant activities.

Ventilation
Ventilation and air cleaning are invaluable for picking up where controlling sources of indoor air pollutants leaves off. The two work hand-in-hand, as many types of air purifiers are an integral part of the HVAC system.
A well-designed and properly operating HVAC system brings in and conditions outdoor air and circulates the air through the building. The primary benefit beyond warming, cooling and managing the humidity the air is to dilute indoor air pollutants to minimize their impact on the indoor environment and building occupants. The HVAC system also transports indoor air contaminants outside. In addition, the HVAC system is invaluable for maintaining appropriate building pressurization, which is critical for preventing moisture intrusion. The downside is the HVAC system may bring in outdoor air pollutants as well as pick up indoor pollutants, such as mold spores, allergens, dust and VOCs from one area of the building and transport them to another.

Air cleaning
Simply stated, with respect to air cleaning the goal is to remove indoor pollutants by trapping them inside a mechanical device. Experts emphasize that air-cleaning devices alone cannot ensure good IAQ, particularly where ventilation itself is inadequate. As noted, air cleaning is most effective when used in conjunction with source control and ventilation (USEPA 2006). Air cleaners / purifiers employ various types of filtration technologies, which can be used in portable units that can be moved from room to room and can be attached to HVAC systems.

2. AIR CLEANING TECHNOLOGY

When you are trying to repair the air purifiers, make sure you understand the technologies used by the air purifier and the potential issues that may be inherent in that technology which could effect the efficiency of the air purifier and your health. Most of air purifiers may use multiple technologies in their design.

Mechanical filtration

Capturing particles in a filter via physical mechanisms without electrostatic forces characterizes this air cleaning method. These units are capable of capturing small particulate matter. They utilize a filter media with very high efficiency ratings. The Letters in the word HEPA stand for High Efficiency Particulate Arrestance. HEPA filters are composed of a mat of randomly arranged fibres. Key metrics affecting function are fibre density and diameter, and filter thickness. The air space between HEPA filter fibres is much greater than 0.3 microns. A common misperception is that fibrous filters (the most extensively used in mechanical filtration) work like a sieve, with particles becoming trapped within the spaces between the fibers. What actually occurs is that once the particles make contact with the fibers, they remain attached due to strong molecular forces between the particles and fibers. As a result, the particles become a part of the filter structure and contribute to a filter's efficiency by creating resistance of air flowing through the filter. The filter can capture 99.97% of particles as small as 0.3 microns. The disadvantage of HEPA filters is that the need for a powerful fan leads to increased noise and energy costs compared to less efficient filtration systems, and replacement filters are generally quite expensive. Critical design details are important in achieving high air cleaning performance. If an air purifier using a HEPA filter is not properly designed, air will bypass the filter as static pressure pushes against the filter and allow particle escape. Most air purifiers on the market include HEPA filters as a sales and marketing tactic, but fail to achieve HEPA performance.

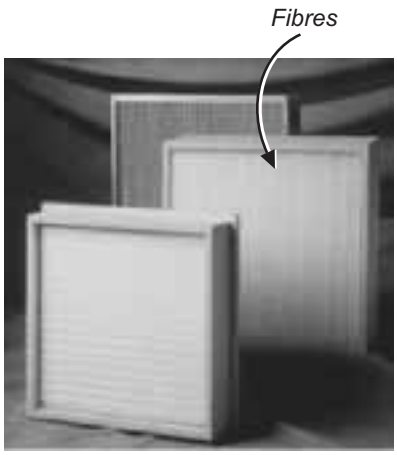

Fig. 1.2-1 HEPA filter is composed of a mat of randomly arranged fibres.

Electronic filtration

Electrostatic Precipitators, most commonly referred to as electronic air purifiers, operate on electrostatic attraction to a collecting section usually called a electronic cell. A typical two-stage electronic cell has an ionizer section (the front portion of the cell) and a collector section (the back portion of the cell). The ionizer wires are maintained at several thousand volts by the high voltage power supply, which produces a corona that releases electrons into the air stream. These electrons attach to the dust particles and give them a net positive charge. The collector section is composed of alternate parallel plates which are charged oppositely (positive and ground) and the charged particulate adheres to the collecting surfaces. The air velocity between the plates needs to be sufficiently low to allow the dust to fall and not to be re-entrained in the air stream. The electronic cell is capable of removing particles in the range 0.01 micron to 10 microns and can achieve efficiencies around 95 percent. Electronic cell has a very low pressure drop and high efficiency on very small particulate. Electronic air purifiers become less efficient as the collecting cell becomes dirty. As the surface of the collecting area becomes heavily coated, the charge to attract the particulate is less effective. The electronic cell must be cleaned regularly to maintain maximum efficiency. The advantages of electronic air purifiers are they generally have low energy costs because of low air pressure drop, the airflow through the units remains constant with use and the electronic cell is reusable, which avoids long-term filter replacement costs. Electronic air purifiers also can create ozone as a byproduct of ionization. However, these devices are not considered to be "ozone generators" as the level of ozone created is generally low and ozone production can be reduced by adjusting the high voltage power supply.

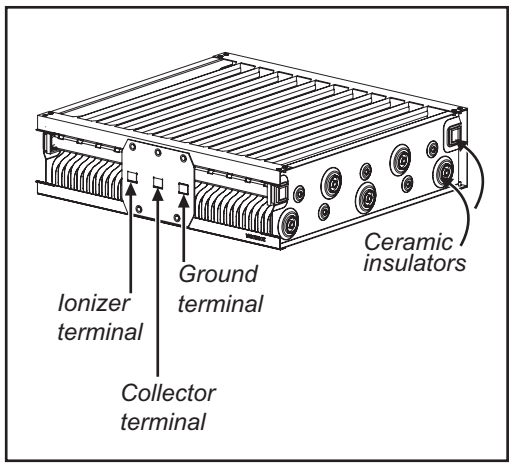

Fig. 1.2-2 The two-stage electronic cell of 200T. For more information, see PARTIII PRODUCT INFORMATION in this manual.

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Electret media filter-synthetic (Hybrid Filters)

Electret media filter is a hybrid of a mechanical filter and electrostatic filter or an ion generator in an integrated single filter. The media filter made from synthetic fibers is inherently negatively charged in the manufacturing process and retains a charge which attracts airborne particles that are trapped and retained within the fibers in the conventional methods of impingement. In some cases, ionizers are used to increase the efficiency of the trapped media. These filters obtain a moderate efficiency on smaller particles than the electronic cell. Electret media filters must be changed or cleaned regularly to maintain system efficiency, as the fibers loose their electrostatic charge as they become soiled.

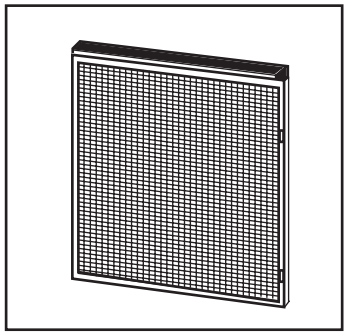

Fig. 1.2-3 The electret media filter, also called as hybrid filter, or synthetic filter.

Negative ion-negative ion generator

Negative ions are negatively-charged electrical particles that are magnetically attracted to allergens and other airborne contaminates, which are positively-charged. The newly-formed larger particles are than able to fall harmlessly to the ground, and out of the air we breathe.

Unlike electronic cell, the ion generators don't remove the particulate matter, they only cause them to accumulate and attach themselves to various surfaces around the room. This means that ion generators only have a temporary effect of eliminating particles from the air. Once the particles lose the charge, they become airborne again. Those charged particles are more easily trapped in the human respiratory system. Ion generators can produce ozone, either as a by-product of use or intentionally.

Some air purifiers use negative ion generators, which are installed at the air outlet to fresh the purified air. Negative ion has proven to be successful in reducing the overproduction of serotonin, and therefore successful in alleviating depression in some cases.

Ozone-ozone generator

Ozone is a molecule with three atoms of oxygen, either directly or as a by product of ionization and electrical precipitation. High voltage causes the oxygen molecules in the air to create ozone (O_3). Ozone does not trap particles, but can remove odors in the air. Manufacturers of air cleaner systems that produce ozone may refer to the ozone as "Supercharged Oxygen", "Activated Oxygen" or "Enhanced Oxygen" Ozone molecules are converted from oxygen molecules. The ozone molecule (O_3) is highly reactive, so whenever it encounters a floating particulate, one of the oxygen atoms breaks away to oxidize the pollutant. This leaves behind O_2 (pure oxygen), refreshing the air even more. Ozone generators do not utilize filters. These machines operate by introducing the highly reactive molecule, Ozone (O_3) into the air.

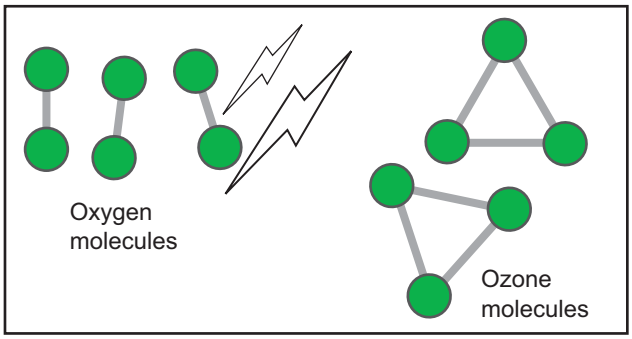

Fig. 1.2-4 Ozone Molecules converted from oxygen (left) as a result of an electrical charge, such as that provided by lightning or UV lights .

This process dissipates air borne pollutants comparably the way that bleaching agents are used to sterilize water. However, ozone is of concern when considering spaces for human occupancy. The high concentration levels required for contaminant control are in conflict with potential health effects as established by authorities including the National Institute of Occupational Safety and Health (NIOSH), and the U.S. Food and Drug Administration (FDA). The problem is that there is much controversy surrounding the use of these machines as "air cleaners". Ozone is considered a hazardous workplace chemical by O.S.H.A. (U.S. Occupational Safety and Health Administration), and is also considered an air pollutant that requires regulation by the E.P.A. (Environmental Protection Agency. Ozone may also be particularly harmful to people with asthma.

OZONE LEVELS AND THEIR EFFECTS

Data from IOA

Edited by Den (Zdenek) Rasplicka - Ozone Services

ppm = Parts per million volume air concentration

0.001 ppm

Lowest value detectable by hypersensitive humans. Too low to measure accurately with elaborate electronic equipment.

0.003 ppm

Threshold of odor perception in laboratory environment, 50 per cent confidence level.

0.003 ppm~0.010 ppm

The threshold of odor perception by the average person in clean air. Readily detectable by most normal persons. These concentrations can be measured with fair accuracy. Ozone levels measured in typical residences and offices equipped with a properly operating electronic air cleaner when outdoor ozone level is low. Infiltrating outdoor ozone could cause higher indoor concentrations.

0.020 ppm

Threshold of odor perception in laboratory environment, 90 per cent confidence level.

0.00~0.125 ppm

Typical ozone concentrations found in the natural atmosphere. These levels of concentration vary with altitude, atmospheric conditions and locale.

0.020~0.040 ppm

Representative average total oxidant concentrations in some major cities in 1964. Approximately 95 per cent or greater of these oxidants are generally accepted to be ozone.

0.040 ppm

CSA limit for devices for household use. Measured as sustained concentration in test room.

0.050 ppm

Maximum allowable ozone concentration recommended by ASHRAE in an air conditioned and ventilated space.

Maximum allowable ozone concentration produced by electronic air cleaners and similar residential devices according to the proposed amendment of the Federal Food, Drug and Cosmetic Act. (Note: Keep this figure in mind when selecting an ozone type air purifier)

0.100 ppm

The maximum allowable ozone concentration in industrial working areas: permissible human exposure - 8 hours per day, 6 days a week.

Continuous maximum ozone concentration allowable (per U.S. Navy_ in confined quarters such as atomic submarines).

Maximum allowable limit for industrial, public, or occupied spaces in England, Japan, France, the Netherlands and Germany.

0.15~0.51 ppm

Typical peak concentrations in American cities.

0.200 ppm

Prolonged exposure of humans under occupational and experimental conditions produced no apparent ill effects. The threshold level at which nasal and throat irritation will result appears to be about 0.300 ppm.

0.300 ppm

The ozone level at which some sensitive species of plant life began to show signs of ozone effects.

0.500 ppm

The ozone level at which Los Angeles, California, declares its Smog Alert No. 1. Can cause nausea in some individuals. Extended exposure could cause lung edema (an abnormal accumulation of serous fluid in connective tissue or serous cavity). Enhances the susceptibility to respiratory infections.

1.00~2.00 ppm

Los Angeles, California, declares its Smog Alert No. 2 at 1.00 ppm ozone concentration and Smog Alert No. 3 at 1.500 ppm. When this range of ozone concentration was inhaled by human volunteers for 2 hours, it caused symptoms which could be tolerated without incapacitation with the symptoms subsiding after a few days. The symptoms were headache, pain in the chest, and dryness of the respiratory tract.

1.40~5.60 ppm

The pinto bean exposed to 1.4 to 5.0 ppm ozone concentrations for 70 minutes showed some signs of severe injury to mature leaves.

5.00~25.00 ppm

Experimentation showed that a 3 hour exposure at 12 ppm was lethal for Guinea pigs. Welders who were exposed to 9 ppm concentration plus other air pollutants developed pulmonary edema. Chest X-rays were normal in 2 to 3 weeks, but 9 months later they still complained of fatigue and exertional dyspnea (labored respiration).

25.00 ppm and up

Ozone concentrations that are immediately hazardous to human life are unknown but on the basis of animal experimentation, and exposure at 50 ppm concentration for 60 minutes would probably be fatal.

Activated Carbon Filter

The activated carbon filter can remove gas and odor. This is the physical process of binding gas molecules to a large surface or pores of an adsorber medium. Activated carbon is the most common media used for adsorption and is produced by heating carbonaceous substances (containing carbon and derived from organic substances such as bituminous coal, wood or coconut shell) to form a carbonized char, then activating (oxidizing) with gases such as steam and carbon dioxide to form pores and creating a highly porous adsorbent material. The effectiveness of odor removing media is related to the amount and type of gasses present in the air, the quantity, type and depth of the adsorbent material and the velocity of the air traveling through the media.

The location of the odor adsorbing media relative to the particle filtration media is also important. If the odor adsorbing media is placed first, then particles in the air will cover the porous structure of the odor adsorbing media and reduce its effectiveness at trapping odors. By placing the HEPA or electronic cell first, particles in the air are captured before the air reaches the odor adsorbing media and allows the porous structure of the odor adsorbing media to have maximum effectiveness at capturing gasses. Room conditions such as air temperature and humidity also effect the capacity of adsorbents to remove odors.

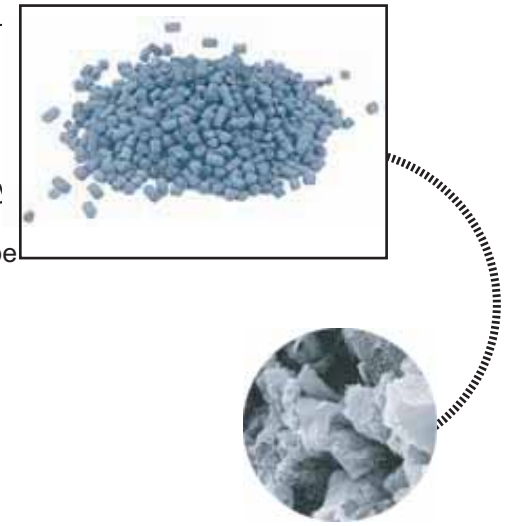

Fig. 1.2-5 Activated carbon pellets and close-up of its pores.

Ultraviolet (UV) Light

UV light is not visible to the human eye. It refers to the part of the wavelength spectrum below visible violet light and above x-rays and gamma rays. All light is a form of electromagnetic radiation. The distinguishing aspect of UV light is the wavelength which is longer than x-rays but shorter than visible light. It is named because the spectrum consists of refrangible electromagnetic waves with frequencies higher than those that humans identify as the color violet. UV light is typically found as part of the radiation received by the Earth from the Sun. Most humans are aware of the effects of UV through the painful condition of sunburn. The UV spectrum has many other effects, including both beneficial and damaging changes to human health. This technology is commonly used in a variety of healthcare and water quality applications where the control of microorganisms is desired.

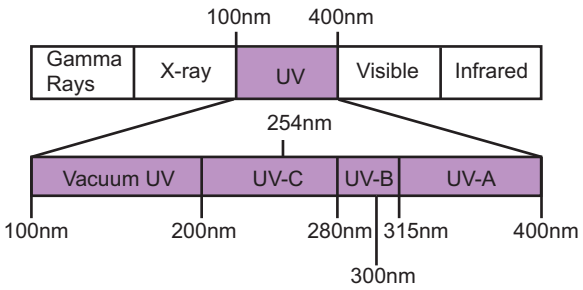

Fig. 1.2-6 The electromagnetic spectrum of ultraviolet light can be subdivided in a number of ways.

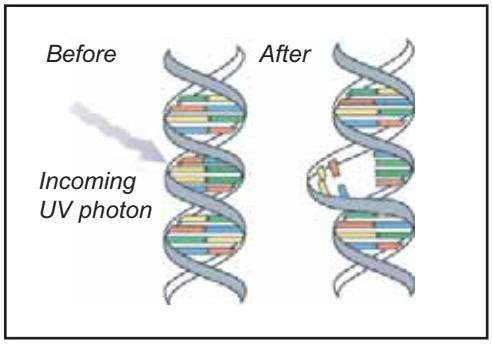

Fig. 1.2-7 Ultraviolet photons harm the DNA molecules of living organisms in different ways.

UV light possesses just the right amount of energy to break organic molecular bonds. As micro-organisms pass by the UV rays radiated from the ultraviolet lamp, this bond breakage translates into cellular or genetic damage for microorganisms, such as germs, viruses, bacteria, fungi (like molds), etc. This results in the destruction of the microorganisms. Many of the air purifiers use UV lamps to kill microorganisms and activate the photo catalyst filter around it.

Photo catalyst

A photo catalyst is a chemical compound that becomes highly reactive when exposed to various wavelengths of UV light. Photo catalytic oxidation is achieved when UV light rays is combined with a TiO_2 coated filter. TiO_2 refers to Titanium Oxide. This process creates hydroxyl radicals and super-oxide ions, which are highly reactive electrons. These highly reactive electrons aggressively combine with other elements in the air, such as bacteria and VOCs. Once they are bounded together, the chemical reaction takes place between the super-charged ion and the pollutant, effectively "oxidizing" (or burning) the pollutant. This breaks the pollutant down into harmless carbon dioxide and water molecules, making the air more purified.

Photo catalytic oxidation

The key to PCO is the photo catalyst. Titanium dioxide (TiO_2) is a semiconductor photo catalyst with the band gap energy of 3.2eV. When this material is irradiated with photons of less than 385 nm, the band gap energy is exceeded and an electron is promoted from the valence band to the conduction band. The resultant electron-hole pair has a lifetime in the space-charge region that enables its participation in chemical reactions. The most widely postulated reactions are shown as Fig. 1.2-10 below.

Hydroxyl radicals and super-oxide ions are highly reactive species that will oxidize volatile organic compounds (VOCs) adsorbed on the catalyst surface. They will also kill and decompose adsorbed bio-aerosols. The process is referred to as heterogeneous photo catalysis or, more specifically, photo catalytic oxidation (PCO). Several attributes of PCO make it a strong candidate for indoor air quality (IAQ) applications. Pollutants, particularly VOCs, are preferentially adsorbed on the surface and oxidized to (primarily) carbon dioxide (CO_2). Thus, rather than simply changing the phase and concentrating the contaminant, the absolute toxicity of the treated air stream is reduced, allowing the photo catalytic reactor to operate as a self-cleaning filter relative to organic material on the catalyst surface.

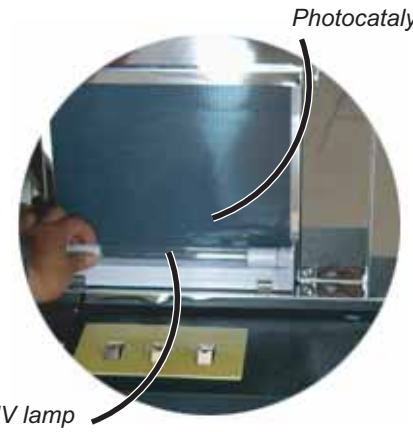

Fig. 1.2-8 UV lamp and photo catalyst of 200T.

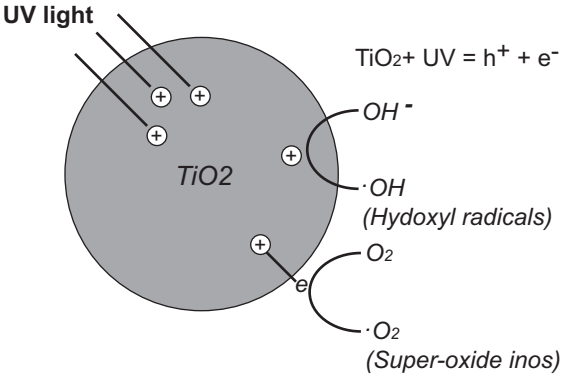

Fig. 1.2-9 How photo catalyst works.

VOC is an acronym for Volatile Organic Compounds. VOCs are organic chemicals that contain the carbon element. They are carbon compounds that easily evaporate at room temperature and often have a sharp smell. They can come from many products, such as office equipment, adhesives, carpeting, upholstery, paints, solvents and cleaning products. Some VOCs can cause cancer in certain situations, especially when they are concentrated indoors. VOCs also create ozone, a harmful outdoor air pollutant.

PART II
AIR CLEANING TECHNOLOY OF THE UNIT

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RespirAide®

FEATURES AND SPECIFICATIONS

The air purifier functions as an air cleaner by helping to disinfect airborne microorganisms and removing particulates from the air. The centrifugal fans of the unit draw air through the front panel on the front of the unit. Then it passes through the Pre-filter, the Electronic cell, the Activated carbon filter and the UV-Photo catalytic sterilization chamber. The purified air is then released through the outlet on the top of the unit.

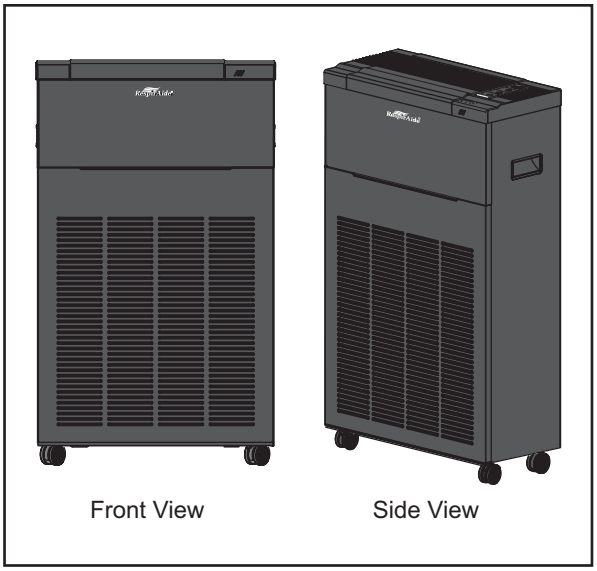

Fig.2.1-1 The front and side view of 200T.

The Air is Cleansed in Six Stages:

1. The Pre-filter traps large dust particles.
2. The two-stage electrostatic precipitator (Electronic cell) captures airborne particles, as small as 0.01 microns. In the ionizing section of the electronic cell, billions of microscopic particles become electrically charged as they pass through the powerful electric field. The collector plates immediately attract and collect these charged dust and dirt particles.
3. The activated carbon filter absorbs and reduces odors, chemicals and gases, removes tobacco smoke, the smell of food and other odors.
4. The UV sterilization chamber kills bacteria and viral microorganisms such as influenza, TB and Legionnaire's Disease as well as other harmful contaminants.
5. When UV light hits the photo catalytic filter; it creates e- and h+, which have an excellent effect in the decomposition of odors.
6. The unit also generates negative ions that freshens the room air.

Features

Multi-Stage Filters

The unit utilizes a two-stage electrostatic precipitator combined with a Pre-filter (for large particles), an Activated Carbon Filter (for odors and gases), UV germicidal light (killing airborne pathogen), a Photo catalytic filter (removes VOC's) and a Negative ion generator.

Automatic Function

The gas sensor (odor sensor) can let the unit automatically select the appropriate fan speed depending on the air quality detected.

Filter and UV Lamp Replacement Indicator

The "Filter life" and "UV Lamps" replacement indicators tell you when to replace the Activated Carbon Filter and the UV lamp.

Safety Micro-Switch (Interlock Switch)

This air purifier is equipped with a safety interlock switch (Micro-safety switch) that will turn the unit off if the front panel is removed while the unit is running.

Easy Maintenance and Low Cost

When the electrostatic precipitator (Electronic cell) needs to be washed or the filters need to be replaced, simply open the front panel and pull out the electronic cell or old filters and put the new or clean one in. No screws, hooks or tools are required. The electronic cell captures small particles on aluminum plates that are simply rinsed off in the sink. There are no expensive filters to replace.

Table 2. Specifications of the unit.

Model No.	RespirAide 200T
Power Requirement	120V,60Hz,0.5A
Rated Power	55W
Fan Motor	120V,60Hz,0.2A
Fan Speed CFM	H-300,M-135,L-88
Applicable Floor Surface (Ceiling height 8')	1 air exchange per hour: 2257 sq.ft. 2 air exchanges per hour: 1129 sq.ft. 5 air exchanges per hour: 451 sq.ft. 19 air exchanges per hour: 10x12 sq.ft. *The applicable floor surface area is appropriate for operating the unit at maximum fan speed.
Noise Level	<45dB
Negative Ion	$3x10^6$pcs/cc
UV Lamp	6W
Cord Length	2.5m (8.3 ft)
Dimensions	82cm (H)x48cm (W)x22cm
Weight	25.7kg (55 lbs)

Standby Power

In order to operate the electrical circuits while the power plug is inserted in the wall outlet, this product consumes about 4.6W of standby power. For energy conservation, unplug the power cord when the unit is not in use.

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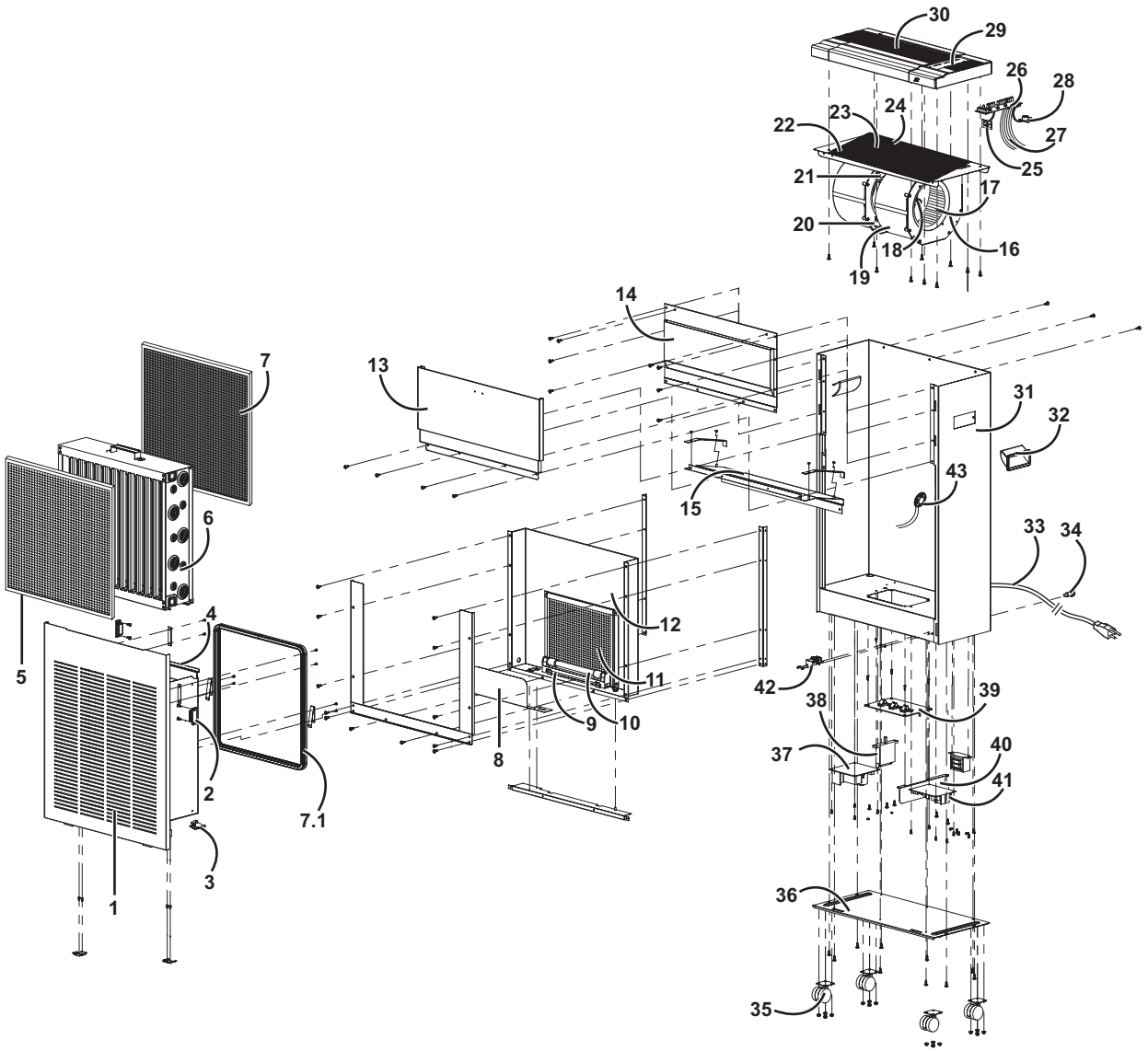
PART II AIR CLEANING TECHNOLOY OF THE UNIT

EXPLODED VIEW OF THE UNIT

In order to fix the problems listed in the troubleshooting part, firsts of all, you will need to know the parts of the unit.



Part Numbers and Names

1. Front Panel (Air Intake Grill)
2. Magnetic Catcher
3. Ground Contact Plates
4. Front Panel Holder
5. Pre-filter (Metal Frame and Mesh)
6. Electronic Cell (Two-Stage)
7. Activated Carbon Filter (VOC Filter)
7.1 Rubber Gasket
8. UV Light Blocker
9. UV-C Germicidal Lamp Holder & Ballast
10. UV-C Germicidal Lamp
11. Photo catalyst
12. UV Light Reflector
13. Unit Upper Cover
14. Fan Motor Front Cover
15. Fan Motor Lower Plate
16. Fan Motor Side Plate
17. Fan Blade
18. Fan Motor
19. Fan Housing
20. Motor Capacity
21. Negative Ion Generator
22. Fan Motor Upper Plate
23. Negative Ion Generator Holder
24. Fan Motor Metal Mesh
25. Remote Control Receiver
26. Display Circuit Board
27. Display Circuit Board Wires
28. Odor (Gas) Sensor
29. Control Panel Cover
30. Plastic Top Cover
31. Unit Housing
32. Unit Handle
33. Power Cord and Holder
34. Fuse and Fuse Holder
35. Caster
36. Bottom Plate
37. Power Supply (HVG)
38. Electrostatic Discharge Switch
39. Unit Power Contact Board
40. Circuit Board Protector
41. Main Circuit Board
42. Interlock Switch
43. Speaker and Wires

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2.1 PRE FILTER

The pre filter is an important part of the unit. Large particles (lint, hair) are caught by the pre filter so to protect the electronic cell.

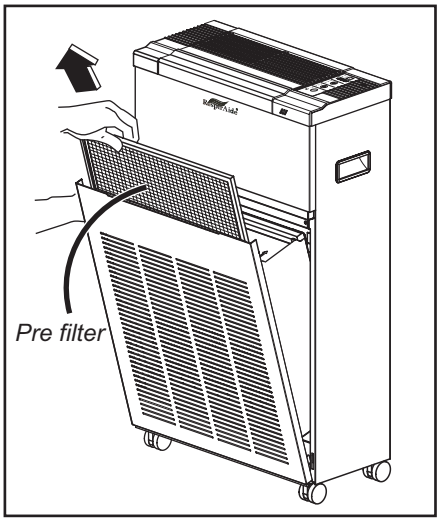


Fig. 2.1-1 Pull out the pre filter.

Cleaning the Pre filter Regularly

To ensure optimum performance from the air purifier, the pre filter and cell must be cleaned regularly-every one to three months. Washing frequency will vary depending on the number of family members, pets, activities (such as cooking or woodworking) and smoking habits. Use the wash reminder schedule mounted on the back of the unit to help establish and maintain a regular cleaning schedule (use marker pen).

-Stop the operation and unplug the power plug from the electrical outlet.

-Hold the front panel (Air intake) upper portion (Left and right side) and pull the front panel toward you (Fig. 2.1-1).

-Remove the pre filter by pulling out in front while holding the front panel.

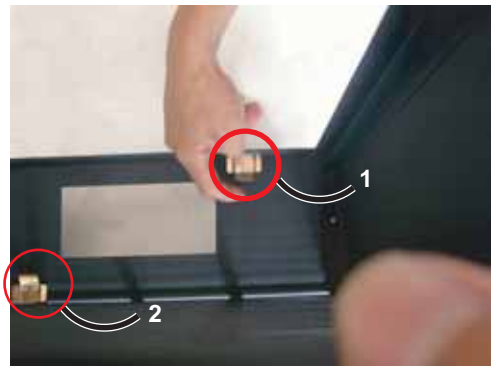
-After using a vacuum cleaner to remove any dust, clean with water. If it is very dirty, use a soft brush or a neutral cleaner to clean then dry well in the shade. Do not wash the pre filter in the dishwasher or car wash.

1. To reduce risk of electric shock always stop the operation and unplug before maintenance.
2. The pre filter should be inspected frequently and collected dirt should be removed from it regularly to prevent excessive accumulation that may result in flashover or a risk of fire!
3. The unit is not designed to be explosion proof and therefore should not be used in atmosphere containing explosive dust or gases. Do not operate without filters in place.
4. Do not cleanse the unit or parts with chemicals such as alcohol, gasoline, paint thinner, etc.. It may cause fire or lead to breakdown of the system.

Pre filter Ground Plate

The pre filter of the unit is manufactured with metal frame and metal mesh. When the unit is working some charges from the ionizing section of the electronic cell will accumulate on the metal mesh of the pre filter. If the metal mesh pre filter does not contact with ground plate it will discharge itself to the air and you can hear cracking sound.

The purpose of pre filter ground plate is to connect it to the ground to avoid sparking or discharge of the pre filter. Do not defeat the pre filter ground plate.



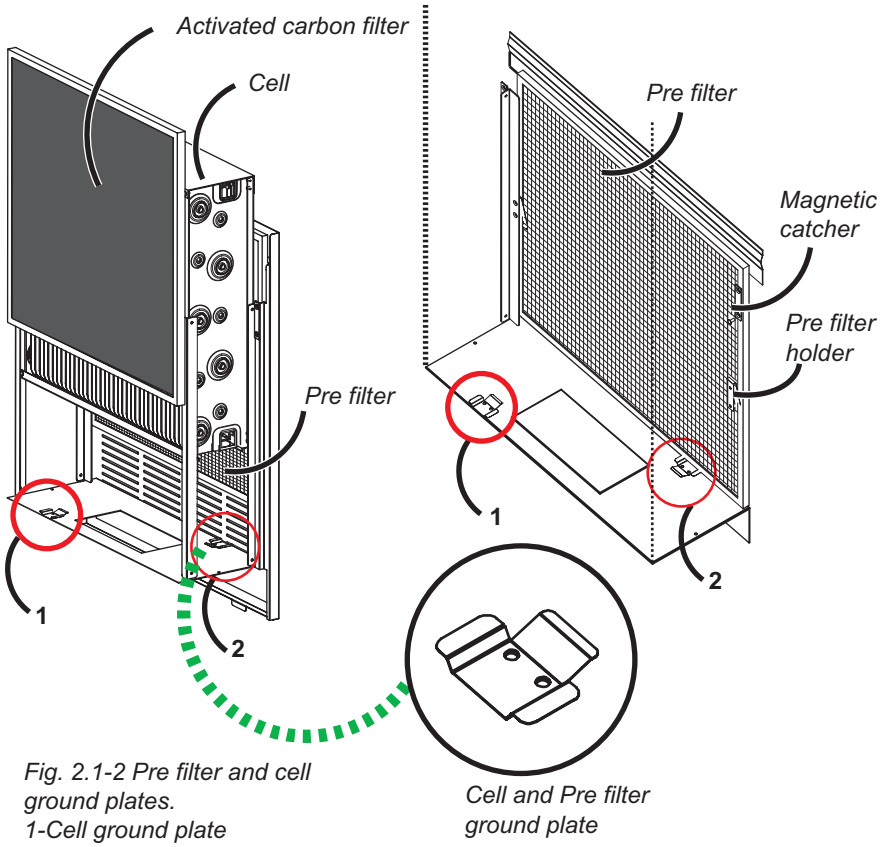


Fig. 2.1-2 Pre filter and cell ground plates.
1-Cell ground plate
2-Pre filter ground plate

ENGLISH

2.2 ELECTRONIC CELL

The unit employs a two-stage electronic cell for particulates collection. It has a stage of ionizer wires and a stage of collector plates. The ionizer wires are maintained at several thousand volts, which produce a corona that releases electrons into the air stream. As the dirty air passes through the intense high voltage electric field surrounded the ionizer wires, all particles, even the smallest are given an electric charge. The air passes into the collector stage where the alternate parallel plates have positive and negative charges, creating a uniform electrostatic field. Since opposites attract, the charged particles stick to the collector plates, having an opposite electric charge. Consequently, the air leaving the air purifier contains very few particles. Theses electrons attach to dust particles and give them a net negative charge. See Fig. 2.2-2.

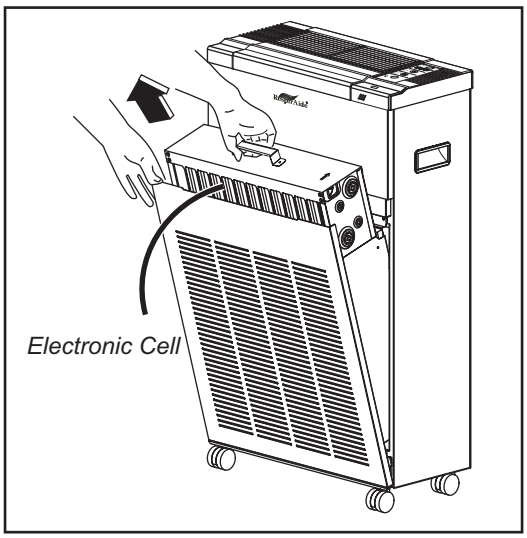
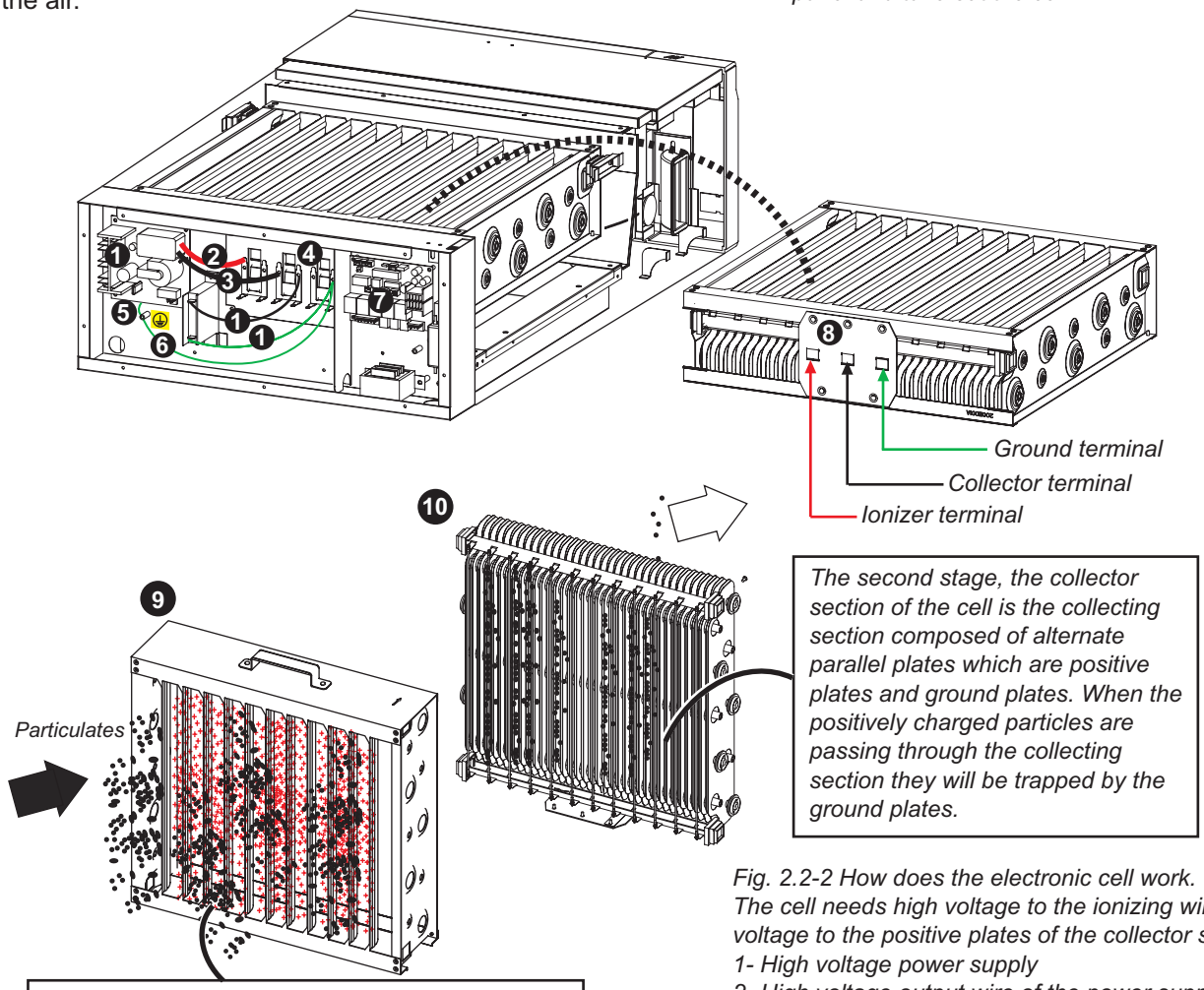


Fig. 2.2-1 Remove the electronic cell.
Stop the operation and unplug the power plug from the electrical outlet. *Open the front panel and take out the cell.*

How Does the Electronic Cell Work?

The high voltage power supply provides the cell high voltage to the ionizer section and low voltage to the collector section through the two power contact terminals. If the power supply is broken the cell cannot work, failing to collect the particulates in the air.



The second stage, the collector section of the cell is the collecting section composed of alternate parallel plates which are positive plates and ground plates. When the positively charged particles are passing through the collecting section they will be trapped by the ground plates.

The first stage, the ionizer section of the cell is the charging section composed of ionizing wires and grounded plates. When the power supply provide high voltage to ionizing wires it create a strong electrical field and give charges to the particles in the air stream. Some of the charged particles are attracted to the ground plates.

Fig. 2.2-2 How does the electronic cell work.
The cell needs high voltage to the ionizing wires and low voltage to the positive plates of the collector section.
1- High voltage power supply
2- High voltage output wire of the power supply (Red color)
3-Low voltage output wire of the power supply (Black color)
4-Unit power contact epoxy board and terminals
5-Power supply ground wire (Green color)
6- Ground screw
7-Main circuit board
8- Cell power contact epoxy board and terminals
9- Ionizer section of the cell
10- Collector section of the cell

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Exploded view of the electronic cell

The cell is mainly composed of aluminum ionizer section ground plates, two kinds of aluminum collector plates (positive plates and ground plates), two kinds of aluminum tubes and its rods, tungsten ionizing wires, ceramic insulators (square and round shape), power contact epoxy board and screws.

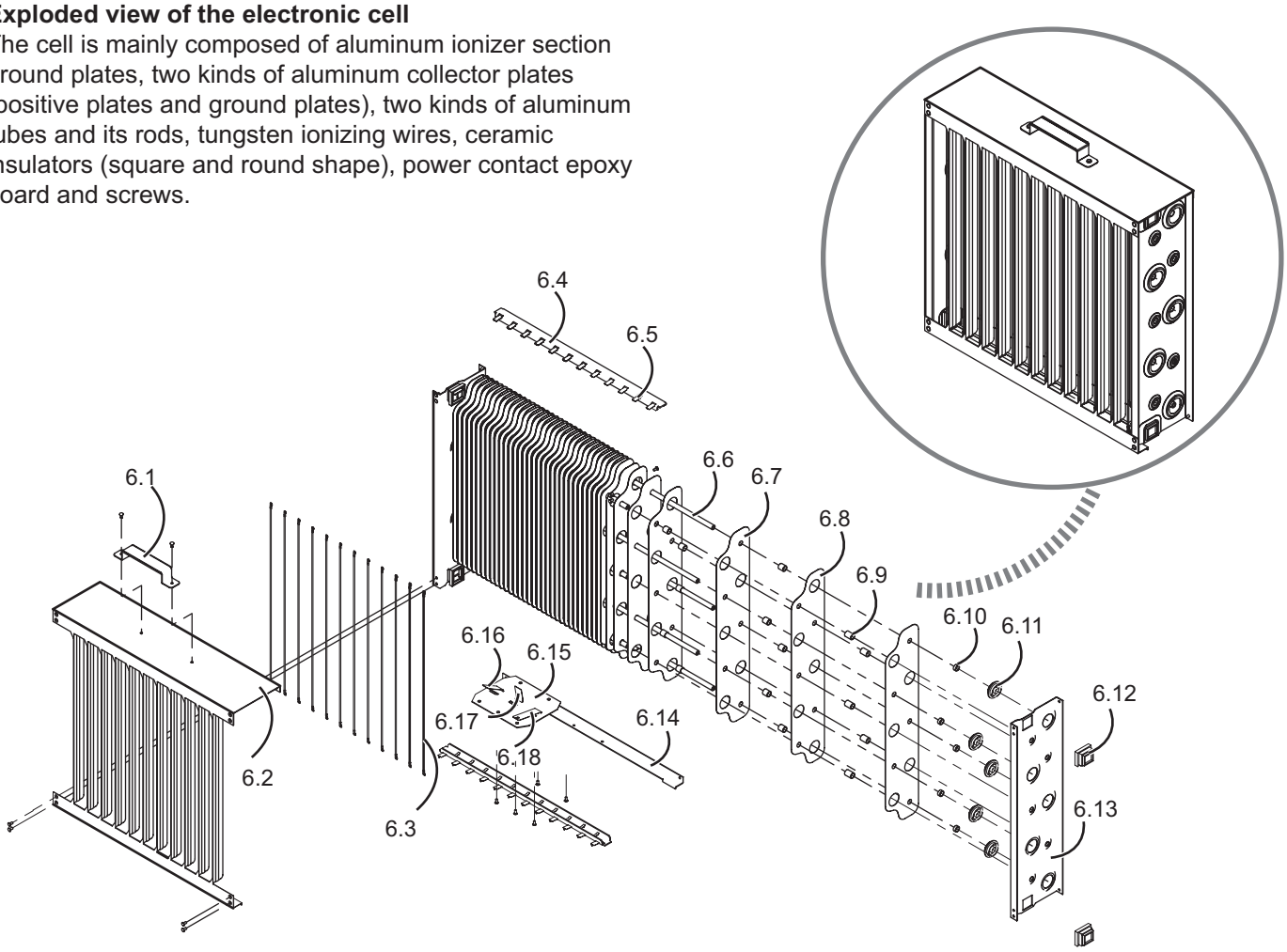

Fig. 2.2-3 Exploded view of the electronic cell.

Part numbers and names of the cell

Cell model number: SD-EC200B
Dimensions: H394mm xW420mm xD110mm
Weight: 3.5kg
Collecting surface area: 3.75m^2
Particle removal efficiency: 90-95% <0.3micron~0.5micron
Power consumption: 4.77W, at high voltage of 7.8KV dc.

200B-6.1 Cell handle x1
200B-6.2 Top plate unit x1
200B-6.3 Ionizer wire with eyelets x12
200B-6.4 Ionizer wire latch holder x2
200B-6.5 Ionizer wire latch x1
200B-6.6 Aluminum tube rod x10
200B-6.7 Collector positive plate x36
200B-6.8 Collector ground plate x35
200B-6.9 Aluminum tube1 (10.4mmx345)
200B-6.10 Aluminum tube2 (13.7mmx10, 4.5mmx10)
200B-6.11 Round ceramic insulator x10
200B-6.12 Square ceramic insulator x4
200B-6.13 Side plate x2
200B-6.14 Bottom plate x1
200B-6.15 Cell epoxy resin board x1
200B-6.16 High voltage terminal x1
200B-6.17 Low voltage terminal x1
200B-6.18 Ground terminal x1

Cleaning the electronic cell

In order to keep the air purifier operating at peak efficiency, it is important to wash the electronic cell regularly. Washing frequency will vary depending on the air quality where the unit operates. If the air is of very poor quality, the efficiency of the cell will degrade rapidly, and may necessitate weekly cleaning. Under normal operating conditions, the cell should be cleaned every one to three months. When you hear frequent sparking sound from the cell you will need to clean the cell immediately. Use the wash reminder schedule mounted on the repair cover of the unit to help establish and maintain a regular cleaning schedule.

The electronic cell can either be submerged in a bathtub or other suitable container and rinsed, or it can be washed in an automatic dishwasher.

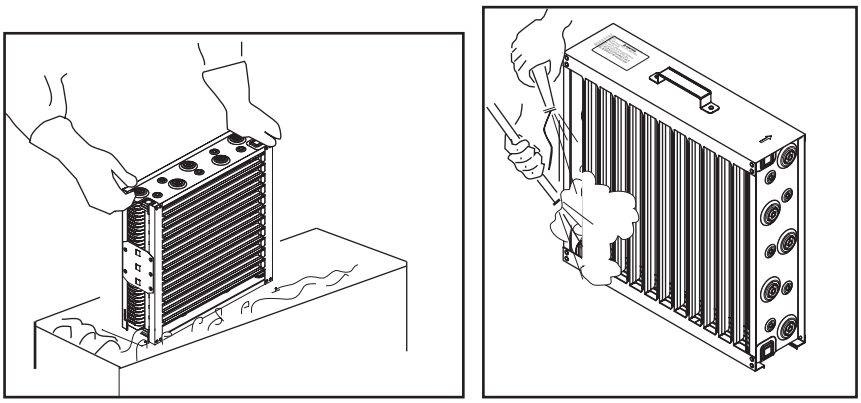

Fig. 2.2-4 Cleaning the cell.
After cleaning, make sure to dry the cell thoroughly before reinstalling. If the cell is wet, it can cause the check unit indicator light flashing or breakdown of the cell and unit.

⚠ WARNING

1. When cleaning the cell, wear rubber gloves to avoid detergent contact with skin.
2. When cleaning be careful not to cut your hands on the ionizing wire. (Wearing rubber gloves is safer.)
3. Be careful not to snag or cut the ionizing wire. If the ionizing wire is cut, replace it immediately. If the unit is operated with the ionizing wire cut, there will be no dust collection.
3. Slide in the cell so the airflow arrow points toward the machine.
4. ***After cleaning, make sure to dry the cell thoroughly before reinstalling.***

Ozone generation of the cell

Electronic cell generates a small amount of ozone, about 0.005 to 0.010 parts per million (ppm). The amount is highest when the cell is new. The average person can detect the odor of ozone in concentrations as low as 0.003 to 0.010 ppm. The U.S. Food and Drug Administration and Health and Welfare Canada recommend that indoor ozone concentration should not exceed 0.050 ppm. As a comparison, the outdoor ozone level in major cities is sometimes higher than 0.100 ppm. If desired, the ozone generated by the air purifier can be reduced by cleaning the cell, replacing the carbon filter or adjusting the high voltage power supply to produce a lower high voltage output. However, the adjustment of the power supply will reduce ozone production but will also reduce air cleaning efficiency. See Fig. 2.2-5.

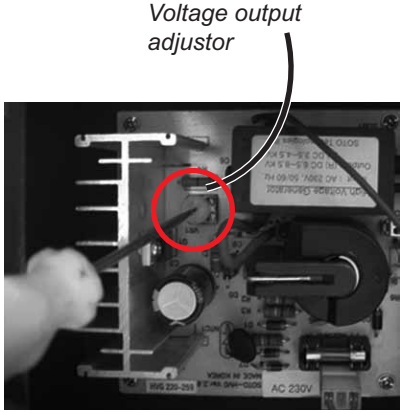

Fig. 2.2-5 Adjust the high voltage output by rotating the adjustor with plastic screwdriver.

Discoloration of the cell

Occasionally, after the cleaning process, the cell may seem stained. If the stain is black or very dark, it is probably detergent residue and should be rinsed off at once. If yellowing appears, it is probably stain from tobacco or other smoke. The yellowing does not affect air cleaning efficiency. Use ammonia based or butyl based detergent to clean tobacco tar and other smoke residue from the collector plates.

2.3 ACTIVATED CARBON FILTER

Activated carbon, the universal adsorbent, has a capacity for virtually all vapor contaminants and will adsorb and retain a wide variety of chemicals at the same time.
The adsorb diffuses thru the surface film to the macropore structure. Then, due to van der Walls' forces, the gas molecule migrates into the micropore structure, condensing during this movement, and finally stopping when either the forces become balanced or it becomes physically blocked.
This molecule, which was an objectionable gas, will remain a liquid inside the carbon until it receives enough energy, in the form of heat, to excite it. If this condition arises, the molecule will begin moving toward the surface. If enough energy (heat) is absorbed, it will be vaporized, returned to a gas and be released back into the air stream, i.e. the process will be reversed.
For information, see page 1-6 in this manual. The activated carbon filter of the unit is located behind the electronic cell (Fig. 2.3-1). To improve the odor removing performance, the unit utilizes a carbon powder impregnated pad not granular form. Room conditions such as air temperature and humidity also effect the capacity of adsorbents to remove odors.
The activated carbon filter should be replaced when it is no longer effective in eliminating odors.

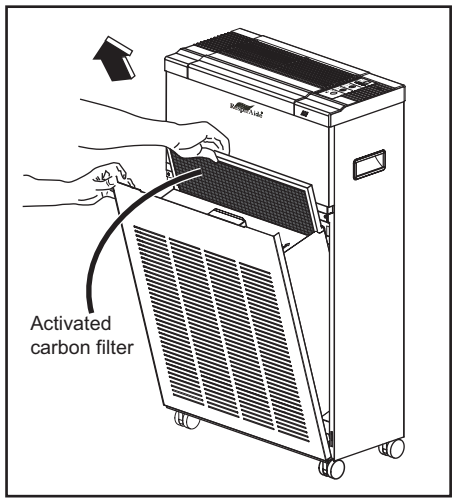

Fig. 2.3-1 Stop the operation and unplug the cord from the electrical outlet. Open the front panel, simply pull out the activated carbon filter.

Replacing the activated carbon filter

The unit has a Filter Life indicator on the display panel, the Filter Life LED indicator light will blink to indicate it is time to replace the carbon filter. The time between activation of the Filter Life indicator light is based on the unit run time that is selected by the manufacturer. In fact, the life of the carbon filter will depend on the concentration of odors and fumes in the air passing through the air purifier.
After replacing the activated carbon filter, press the RESET1 button for 12 times (new model is changed to 5 times) on the remote control or until you hear the beep sound from the unit to initiate the Filter Life indicator light. You also can press the reset button on the main circuit board to reset the activated carbon filter life. For more information about the remote control reset.

2.4 UV lamp and photo catalyst

After removing the activated carbon filter, you can see two lamps and photo catalyst behind them. The unit utilizes nano technology photo catalyst and 6 watt UVC lamps in the 254 nm range.
UVC utilizes the short wavelength of UV that is harmful to forms of life at the micro-organic level. It is effective in destroying the nucleic acids in these organisms so that their DNA is disrupted by the UV radiation.
When the photo catalyst (TiO_2) captures UV light, it forms activated oxygen from oxygen in the air. This process is similar to photosynthesis, in which chlorophyll captures sunlight to turn water and carbon dioxide into oxygen and glucose. The formed activated oxygen is strong enough to oxidize and decompose organic materials or smelling gas, and kill bacteria. For more information, see PART I GENERAL DESCRIPTION ON AIR CLEANING.

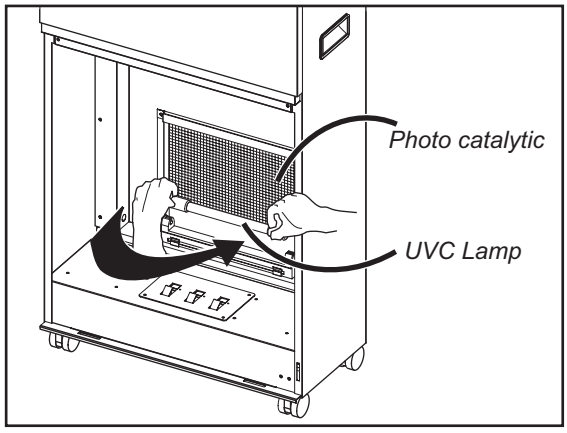

Fig. 2.4-1 Remove the front panel and the swing nut on the UV light blocker to remove the UVC lamp.

Replacing the UV lamp

When the UV Lamps indicator light flashes, it is time to replace the UVC germicidal lamps. After removing the UV light blocker, gently rotate the lamp a quarter turn in either direction until it unlocks from the socket. Pull the pins out the sides of the socket, one end at a time. After replacing the UV lamps, press the RESET2 button on the remote control for 12 times (New model is changed to 5 times) to reset the UV lamps life. You also can press and hold the reset button on the main circuit board for 6 seconds to initiate the UV lamp life.
The photo catalyst will not be replaced. However, remove any dust by a vacuum cleaner.

⚠ WARNING

Always unplug the unit before cleaning, servicing or replacing the UV lamp. Never look directly at UV lamp. Direct exposure to germicidal light can cause temporary or chronic damage to your eyesight, or even blindness.

2.5 NEGATIVE ION GENERATOR

Studies about negative ions have shown that some people become moody, tired, depressed, or experience difficulty concentrating when negative ion counts are low, or when positive ion counts are high, such as in front of a computer monitor. Negative ions help eliminate pollen, mold spores, dust, pet dander, and many other allergy causing particulates from the air we breathe.

The negative ion generator of the unit is secured to the fan housing by a screw and the brush terminal is on the air outlet. See Fig. 2.5-1. The negative ion has two wires, one is red, another is black. Make sure to connect the wires correctly.

Control the negative ion discharge by remote control

When the Neg. Ion indicator light is on, negative ions are discharged. The negative ion generation is controlled by remote control. One press of the Neg. Ion on the remote control will stop the generation of ions and the indicator light will go out. See Fig. 2.5-2~3 below.

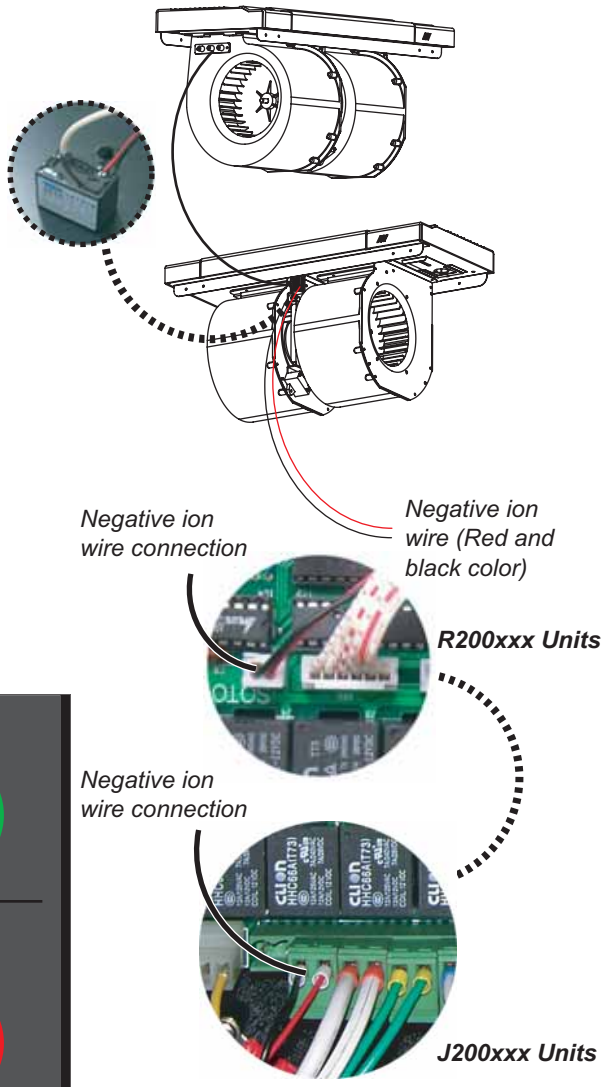

Fig. 2.5-1 The negative ion generator wire connection and its brush terminal .

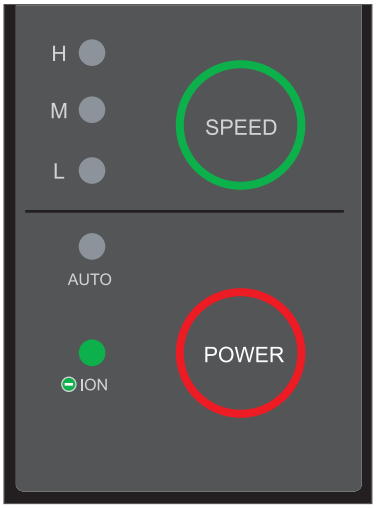

Fig. 2.5-2 When the Neg. Ion is on, the negative ion generator is working.

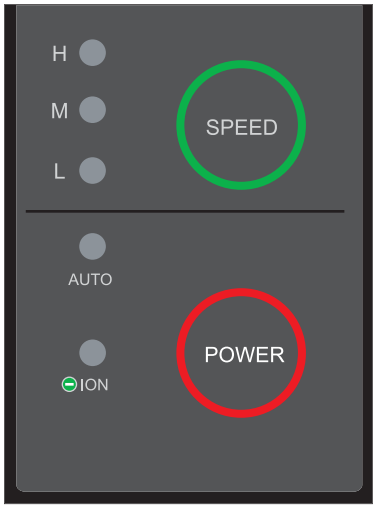

Fig. 2.5-3 Pressing the Neg.Ion button on the remote control will stop the generation of ions and the indicator light will go out.

Specifications of negative Ion generator

Dimensions	27mmx18mmx15mm
Input voltage	12V dc
Amount of negative ion (per cm^3)	$3x10^6$
O3 density	<0.01 ppm
Power consumption	Max. 3W
Voltage output	2800V DC

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PART III
ELECTRICAL SYSTEM OF THE UNIT

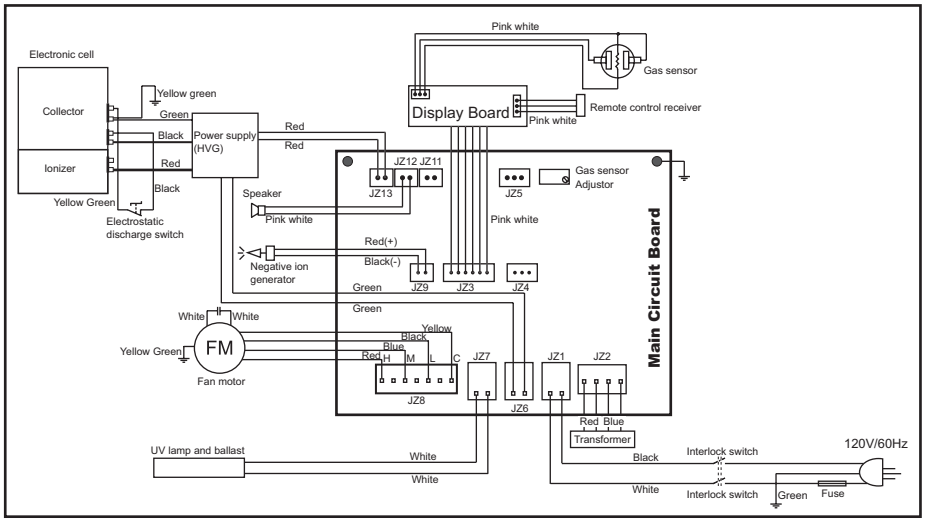
CONTENTS

ENGLISH

RespirAide®

WIRING SCHEMATIC DIAGRAM FOR
R200xxx UNITS

In order to fix the problems correctly, you will need to know the electrical wire arrangement. This wiring schematic is helpful for you to understand the



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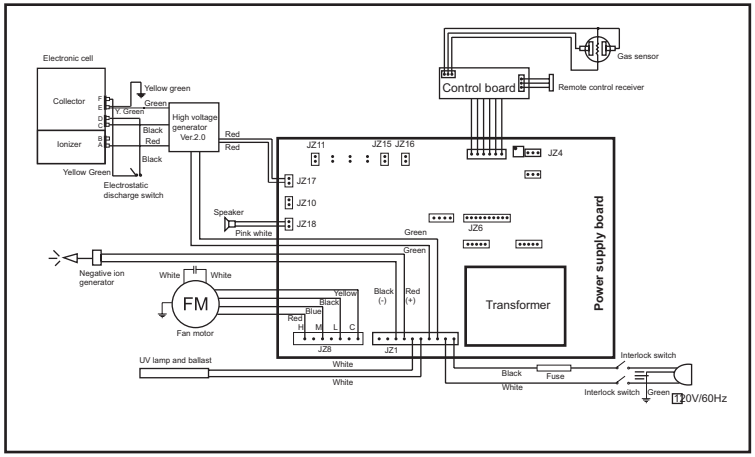
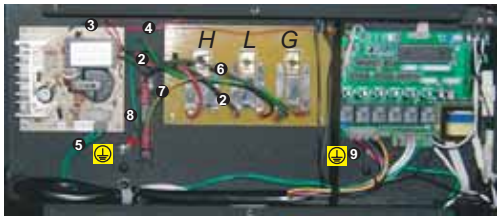
WIRING SCHEMATIC DIAGRAM FOR
J200xxx UNITS

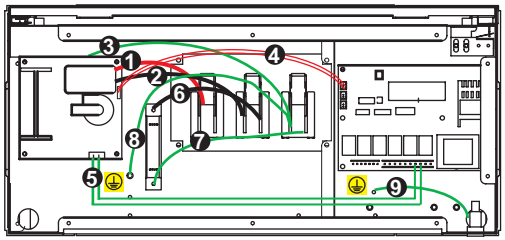
In order to fix the problems correctly, you will need to know the electrical wire arrangement. This wiring schematic is helpful for you to understand the electrical systems of the unit.



DIFFERENT WIRING ARRANGEMENT

To simplify the wiring arrangement, the units will have some different wiring arrangements.



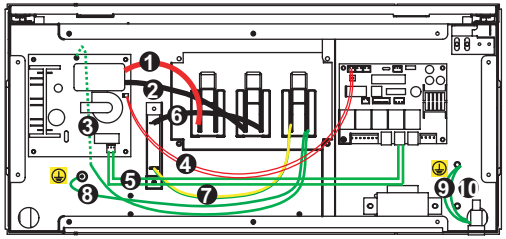


Main circuit board-A

Fig. 3-1 Units starting with ser.#J200xxx.

1-High voltage wire of power supply
2-Low voltage wire of power supply
3-Ground wire of power supply
4-Power supply signal wire
5-Power supply cord wire
6-Voltage wire of discharge switch
7-Ground wire of discharge switch
8-Ground wire to the bottom
9-Ground wire of power cord

**** The transformer is located on the main circuit board and the power supply ground wire is connected to the unit ground terminal.*

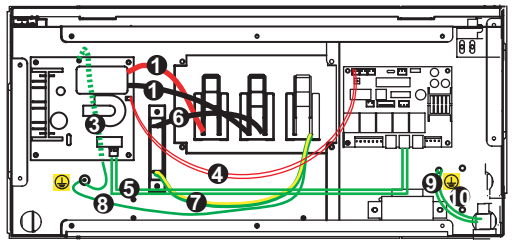


Main circuit board-B

Fig. 3-2 Units starting with ser. #R200xxxB~D.

1-High voltage wire of power supply
2-Low voltage wire of power supply
3-Ground wire of power supply
4-Power supply signal wire
5-Power supply cord wire
6-Voltage wire of discharge switch
7-Ground wire of discharge switch
8-Ground wire to the bottom
9-Ground wire of power cord
10-Motor ground wire

**** The transformer is separated from the main circuit board and the power supply ground wire is grounded through the ground wire. The motor ground wire is secured with power cord ground wire.*



Main circuit board-B

Fig. 3-3 Units starting with ser.# R200xxxE.

1-High voltage wire of power supply
2-Low voltage wire of power supply
3-Ground wire of power supply
4-Power supply signal wire
5-Power supply cord wire
6-Voltage wire of discharge switch
7-Ground wire of discharge switch
8-Ground wire to the bottom
9-Ground wire of power cord
10-Motor ground wire

**** The transformer is separated from the main circuit board and the power supply ground wire is directly grounded. The motor ground wire is secured with power cord ground wire.*

ENGLISH

3.1 POWER CORD, FUSE AND INTERLOCK SWITCH CONNETIONS

It is necessary for you to understand how the power cord, fuse and interlock switch are connecting together before you learn the other electrical system of the unit (Fig. 3.1-1).

1. Ground wire: The ground wire of the power cord is securely fixed at the metal bottom of the unit so that all the metal parts of the unit is grounded.

2. Live line: The white colour Live line of the power cord, at first, goes through the fuse by wire connection and than goes to the interlock switch, finally connected to the main circuit board. If there is a short circuit in the unit, the fuse will be blown out to protect the whole machine. When opening the front panel, the interlock switch will work and interrupt the Live line at once.

3. Neutral wire: The Neutral wire of the power cord directly goes through the interlock switch and goes out to the main circuit board. When you open the front panel the interlock switch will also interrupt the Neutral wire at once to protect people touching the electrical parts of the unit.

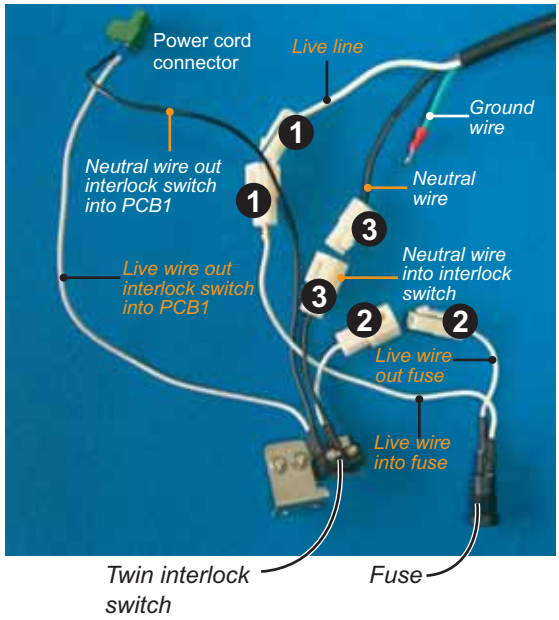
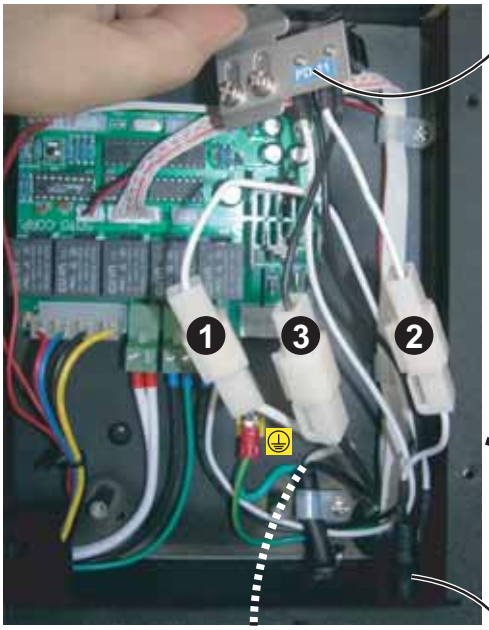
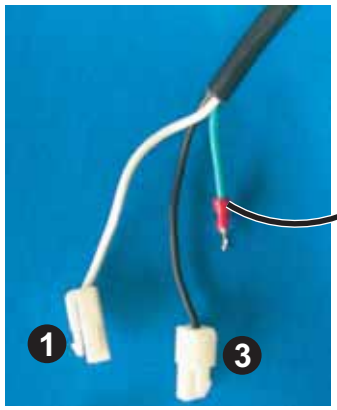
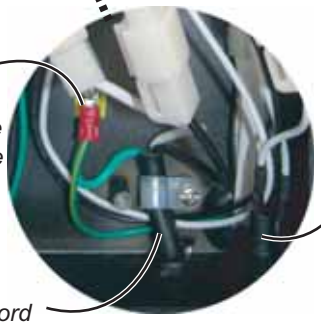


Fig. 3.1-1 Power cord, fuse and interlock switch.

The below picture (Fig. 3.1-2) shows the wire arrangement in the unit. It will be easy for you to figure out the wires if you understand Fig. 3.1-1.







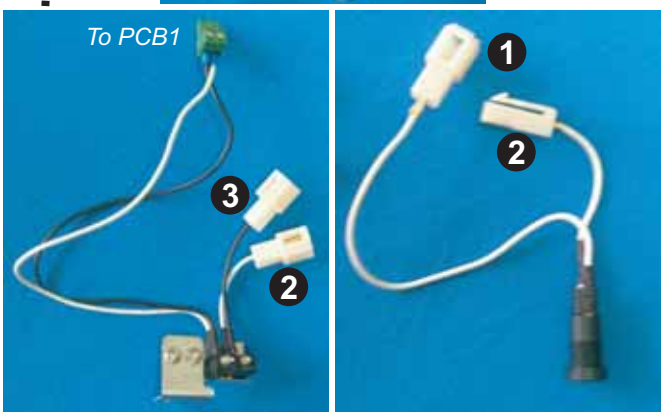


Fig. 3.1-2 Power cord, fuse and interlock switch. The Live line (White color) connects the fuse through connector 1# and connects the interlock switch through connector 2# and then goes into the main circuit board (Right side pin at the power cord connection, green color).
The Neutral wire (Black color) connects the interlock switch through connector 3# and goes into the main circuit board (Right side).
The green ground wire of power cord is grounded with the motor ground wire (Yellow green color).

ENGLISH

Electrical power cord

The unit uses a grounding type plug, rating for 16-18 AWG. This plug will only fit into a grounded power outlet. If the plug does not fit into the outlet, contact a qualified person to install the proper outlet. Do not alter the plug in any way.

The power cord has three wires, the green colour Ground, the white color Live line and the black color Neutral wire. The power cord is secured on the back of the unit by power cord strain relief bushing.

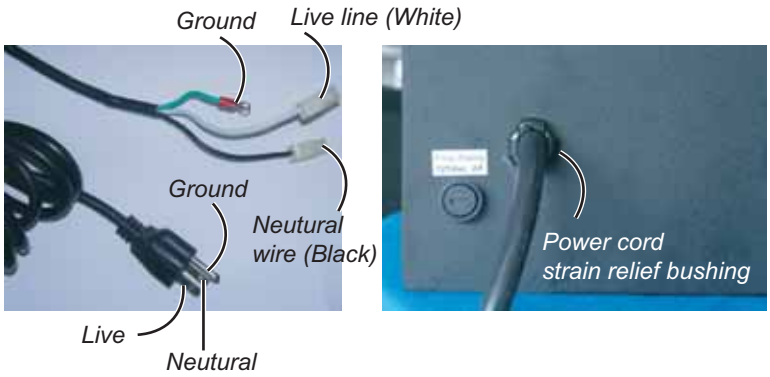


Fig. 3.1-3 Electrical power cord of the unit.

Fuse

You can see the fuse holder on the back (left bottom) of the unit. The rating for the fuse is 125V, 2A. One spare fuse is prepared in the operation manual plastic bag.

The Live line passes through the fuse and interlock switch before it is connected to the main circuit board (Fig. 3.1-1~2). The fuse will be blown out when there is a short circuit in the unit or a electrical leakage on the power cord wires.

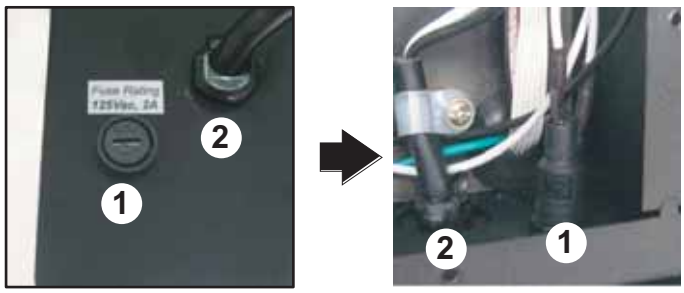


Fig. 3.1-4 The fuse holder and power cord on the back of the unit.
1-Fuse hoder, 2-Power cord and strain relief bushing.

Interlock switch

There are two same interlock switches in the unit. One interlock switch is connected to the Neutral wire of the power cord (Black color) before it connect to the main circuit board. Another interlock switch is connected to the Live line passing through the fuse before it goes to the main circuit board (Fig. 3.1-1~2). Each interlock switch is provided with a lever which can be actuated by the actuator on the front panel. The two interlock switch open all supply conductors simultaneously when opening the front panel for servicing (Fig. 3.1-5). When the front panel is closed the actuator pushes down the interlock switch levers and the unit will operate. When the front panel is opened the levers will be spring out and interrupt the Live line and Neutral wire at the same time to stop the operation. The purpose of the interlock system is to interrupt the operation of the unit when the front panel (air intake) is opened by accident, and similarly, to prevent any operation until the front panel is firmly and safely closed. If one or two of the interlock switch levers are broken the unit can not be operated. Also, if the actuator can not push down the interlock switches the unit

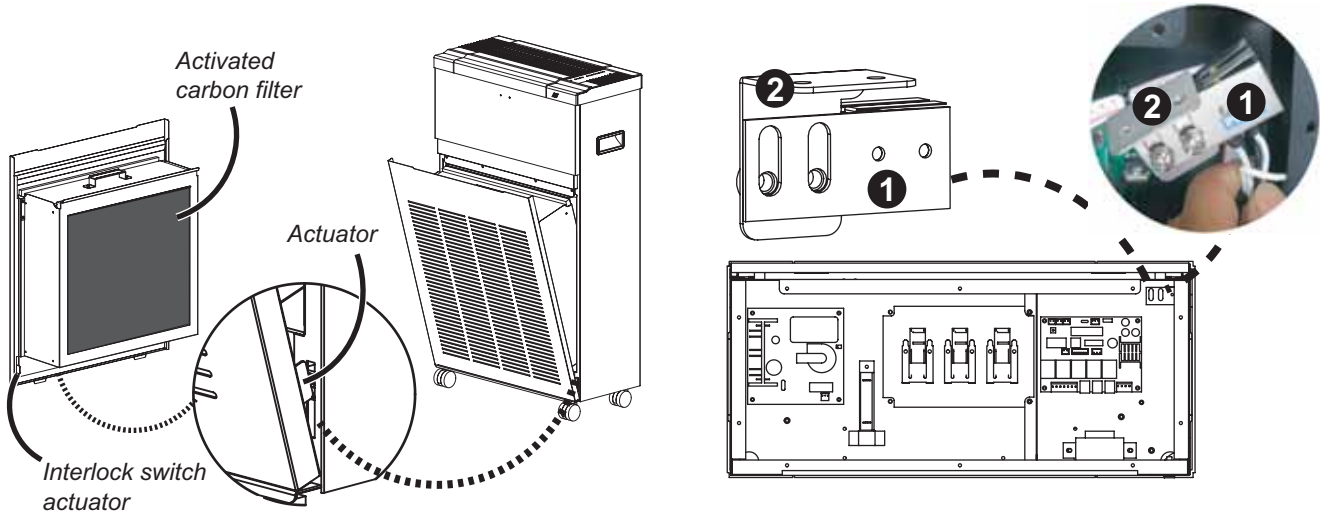


Fig. 3.1-5 The interlock switch (100000 cycles endurance).
When you remove the bottom plate you can find the twin interlock switch on the right upper corner of the bottom. The two interlock switches are put together with the stainless metal plate 1# and connected to the bottom by stainless metal plate 2#. The height of the metal plate 1# is about 1mm higher than the interlock switch so to protect the lever from breakdown when the actuator push down the interlock switches.

ENGLISH

3.2 ELECTRICAL CIRCUIT BOARDS

The main circuit board and the display circuit board are most important parts of the unit. Pressing any buttons on the control panel will control the main circuit board through the display circuit board wire for the unit to carry out the desired functions. There will no display lights or incorrect display on the display panel if the display circuit board wire connections are loosened, the main circuit board or display circuit boards are broken (Fig 3.2-1).

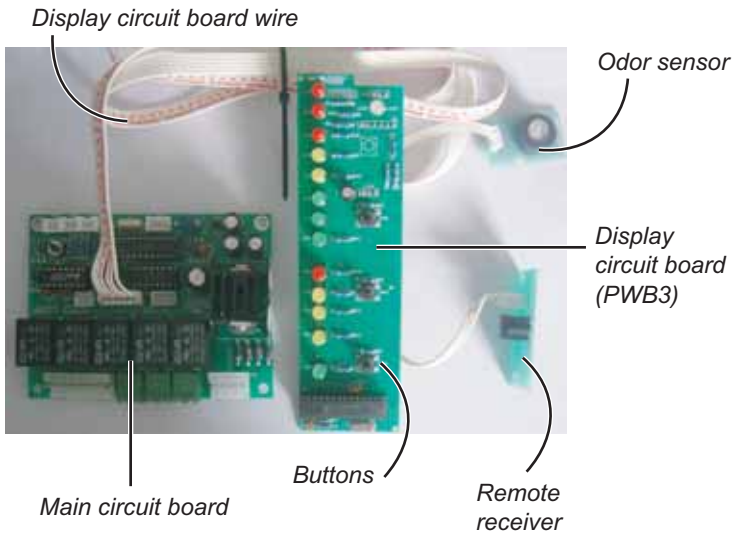
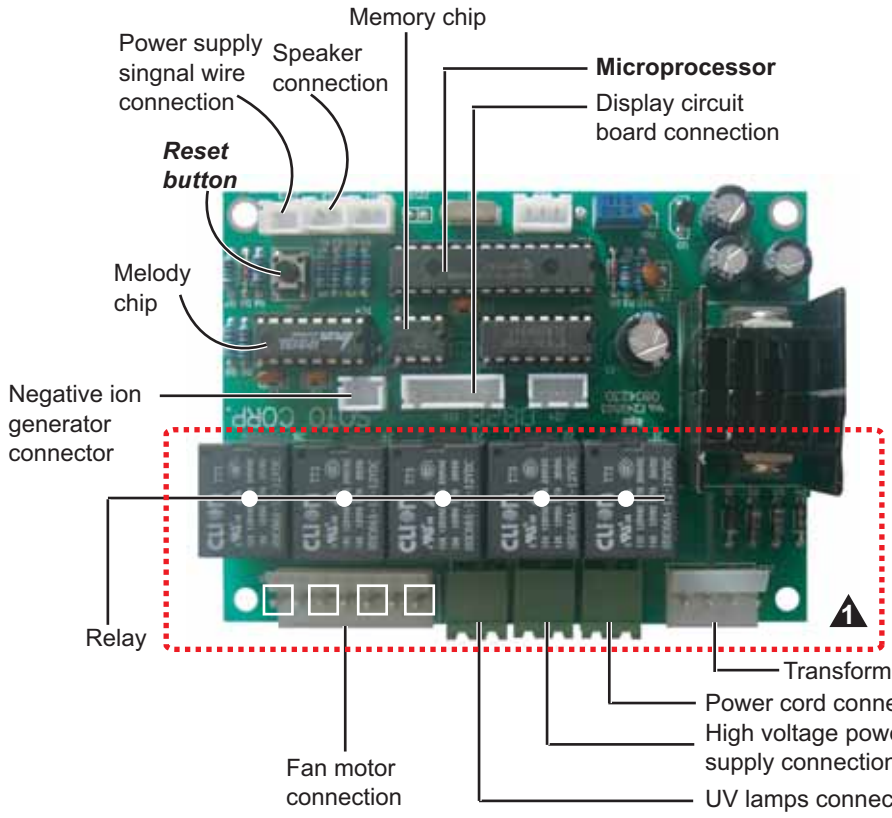


Fig. 3.2-1 Main circuit board / display circuit board

Main Circuit Board (PWB1)

The main circuit board is secured by four plastic stand-offs at the bottom of the unit.



Integrated circuit (IC) is also known as a chip.

Fig. 3.2-2 Main circuit board and connections. See Wiring Schematic on page 3-1.

1 *-Do not touch this area of circuit board with hand when the unit is on, the voltage in this area is 120V ac. If not, electrical shock or personal injury will occur.*

ENGLISH

Display circuit board

The display circuit board is located inside the plastic control panel cover. The circuit board is connected to the main circuit board by display circuit board wire. If the display circuit board wire connections are loosened, or circuit boards are broken there will no display lights or incorrect display indicator lights on the display panel (Fig. 3.2-3).

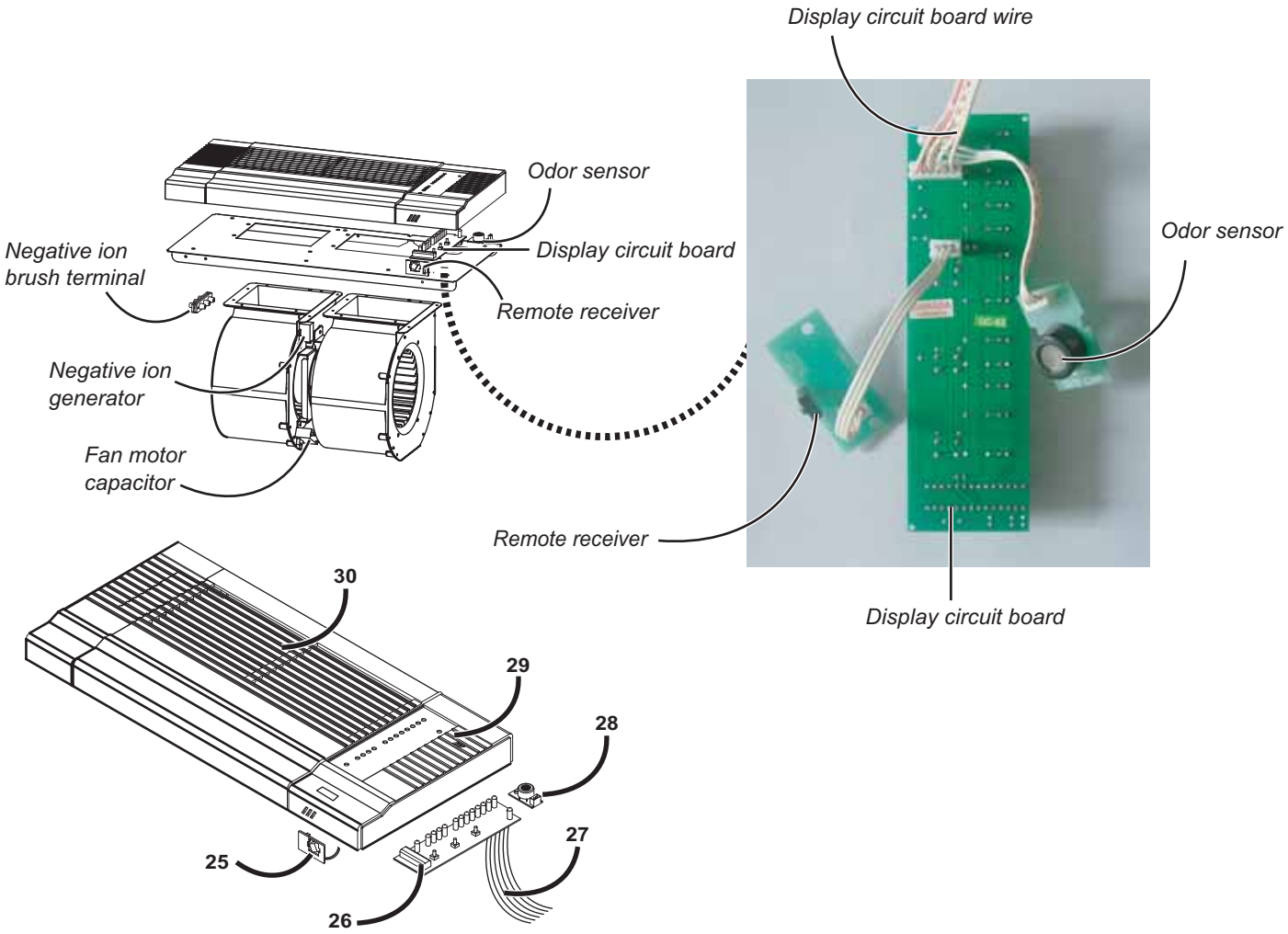


Fig. 3.2-3 The plastic top cover and display circuit board.
25-Remote control receiver
26-Display circuit board
27-Display circuit board wire
28-Odor sensor
29-Plastic control panel cover
30-Plastic top cover

For further information on PCB

Circuit boards were created in the mid-1930s. Commonly known as PCBs (printed circuit boards), circuit boards consist of an insulator (usually fiberglass), with threads of conductive material serving as wires on the base of the board. The insulator may consist of one or numerous layers of material glued into a single entity. These additional layers may serve a number of purposes, including providing grounding to the board. The threads on the surface of a circuit board are usually copper, created either by laying down individual lines mechanically, or by coating the entire board in copper and stripping away excess. Since the 1980s most circuit boards use surface-mounted components. These components are designed with small tabs, and are made to be easily soldered in place on the board with very little hassle. In modern circuit board production, this process is usually performed by placing the cool solder mixture, and baking the entire board to melt the components in place. Prior to the creation of surface-mount technology in the mid-1960s, all circuit boards used wire to attach components to the board. With the need for wire eliminated, circuit boards have become lighter and more efficient to produce.

3.3 HIGH VOLTAGE POWER SUPPLY AND UNIT POWER CONTACT BOARD

High voltage power supply

The power supply provides high and low voltages to the cell through the power contact terminals. If the power supply is broken the electronic cell cannot create electrical field in the cell, failing to capture the particles which are passing through the cell. It is necessary to monitor the power supply working condition when the unit is working. There are the red signal twin wires which connect the power supply and the main circuit. When the voltage on the signal wire is above 1.3V dc, the main circuit board regards the power supply-cell system is working correctly. Once the voltage on the signal wire is less than 1.3V dc, the CHECK indicator light on the display panel will flash with warning beeping sound.

However, if the C10 resistance (Fig. 3.3-1) on the power supply circuit board is broken the signal voltage will also be decrease under 1.3V dc, the main circuit board also lights the CHECK indicator light even if the power supply is working correctly.

When you rotate the voltage output adjustor on the circuit board with plastic flat head screwdriver, the high and low voltage output will increase (clockwise) or decrease (counter-clockwise) at the same time. For some information, see **2.2 ELECTRONIC CELL**.

Unit power contact terminals

The unit power contact board has two power contact terminals and one ground terminal. The high voltage power supply provides high voltage (7.5-7.8KV DC) to the ionizer wires and low voltage (3.5~4.5KV DC) to positive collector plates of the cell through the two power contact terminals (Fig. 3.3-2). The power supply and the cell are grounded by the unit ground terminal.

If the power contact board (epoxy resin insulation board) is damaged or wet, the high or low voltage wire of the power supply will be short to ground, causing the cell working failure and CHECK indicator light on the display panel will flash.

The space between the high voltage terminal 1# (Fig. 3.3-2) and the board securing screws should be kept enough space to avoid the sparking happening. Any sparks will interfere with the display circuit board wire, leading the incorrect work of the display circuit board. For some information, see **5.8 SPARK BETWEEN HIGH VOLTAGE TERMINAL AND SCREW**.

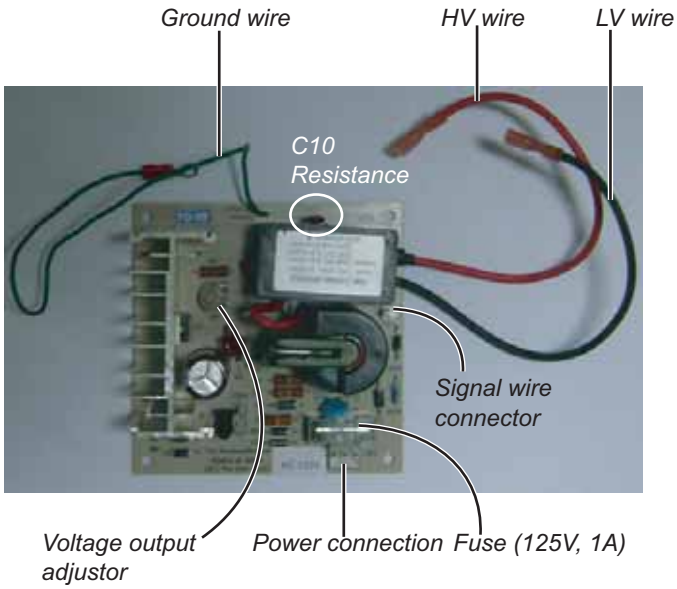


Fig. 3.3-1 The high voltage power supply.

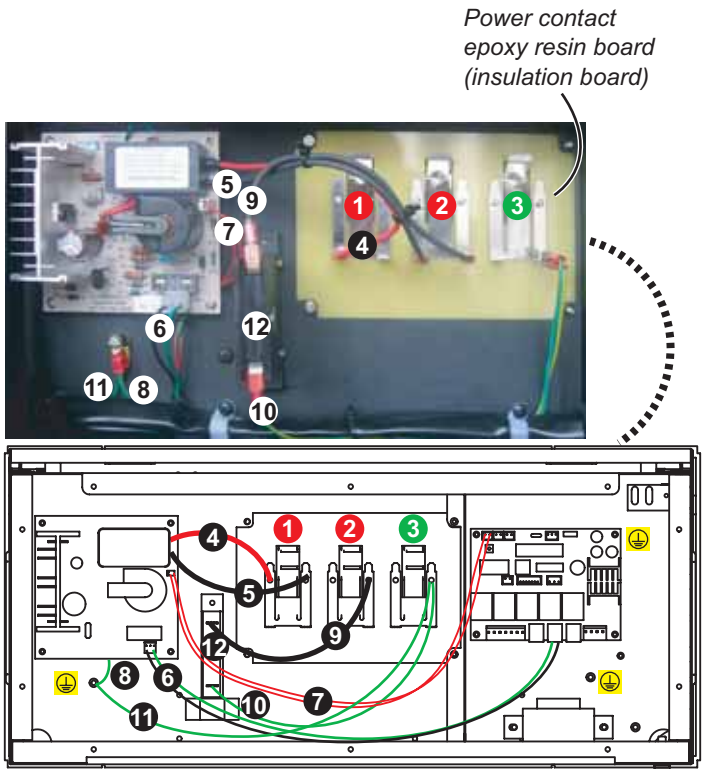


Fig. 3.3-2 The unit power contact board and wire connections.
1-High voltage terminal
2- Low voltage terminal
3-Ground terminal
4-High voltage wire of power supply
5-Low voltage wire of power supply
6-Power supply power cord
7-Power supply signal wire
8-Power supply ground wire
9-Discharge switch voltage wire
10-Discharge switch ground wire
11-Unit ground wire
12-Discharge switch

ENGLISH

3.4 DISCHARGE SWITCH

The electronic cell will normally maintain a painfully high voltage charge when you pull out the cell without stopping the unit. In fact, the high voltage power supply is designed to discharge the cell automatically. To discharge the cell automatically, the power supply needs 3-6 seconds after stopping the operation. It means that the cell will be no charge if the customer stops the operation before taking out the cell.

The problem is some customers do not follow the notice instructions on the stickers or in the manual, opening the front panel without stopping the unit and pulling out the cell quickly. To solve this problem, the discharge switch is added to the unit to discharge the remaining charge on the cell when you take out the cell without stopping the operation. The discharge switch has two wires. One is voltage wire which is connecting the low voltage wire of the power supply through the unit power contact terminal. Another is ground wire which is grounded through the unit ground terminal. If the lever of the switch is pressed down by the front panel the discharge switch does not work. It is because of the voltage wire separation from the ground wire. However, as the front panel is opened and the switch lever is sprung out the voltage wire is connecting the ground wire to create a short circuit (direct connection) between the power supply and the ground to discharge the collector section of the cell (Fig. 3.4-1).

Unfortunately, the discharge switch has only one voltage contact plate, it means the discharge switch cannot discharge the ionizer and collector section of the cell at the same time. Because of the much more remaining charge on the collector plates, generally it is recommended that the discharge switch should connect the low voltage contact terminal to discharge the cell collector section. Another important reason is if the discharge switch is connected to the high voltage contact terminal, trying to discharge the ionizer section, there will be sparks around the discharge switch as the voltage plate inside the switch have to sustain very high voltages (7.5-8KV). For more information, see **5.9 DISCHARGE SWITCH SPARK**.

If the unit is powered on but the discharge switch lever is not pushed down the CHECK indicator light on the display panel will flash because of the short between the switch and the power supply low voltage wire (Fig. 3.4-1).

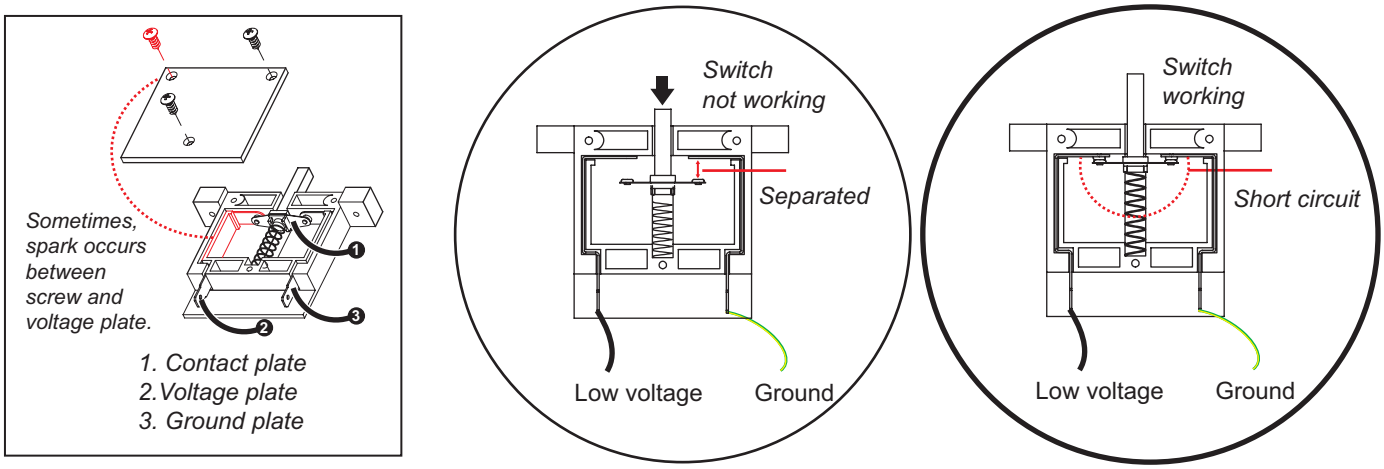


Fig. 3.4-1 Discharge switch

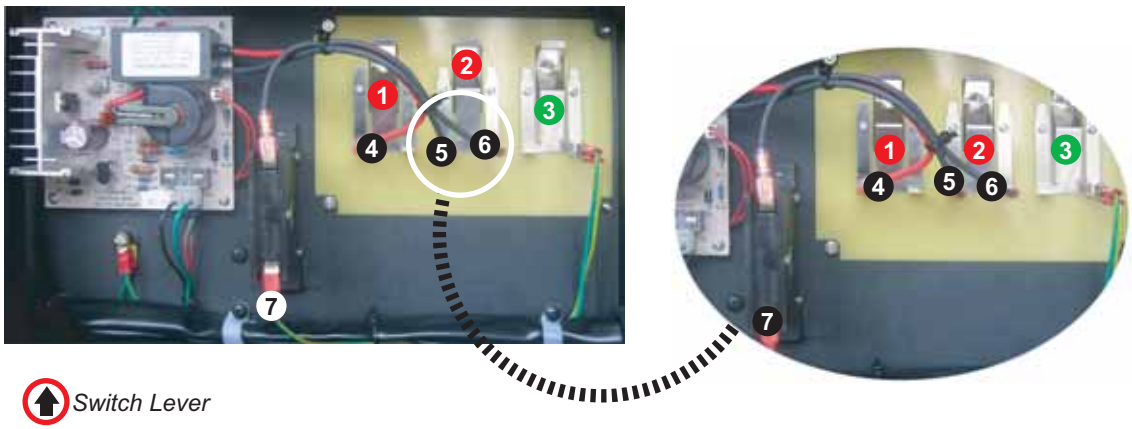


Fig. 3.4-2 The discharge switch is connected to the low voltage power contact terminal to discharge the collector section of the cell.
1-Unit high voltage contact terminal
2-Unit low voltage contact terminal
3-Unit ground terminal
4-High voltage wire of power supply
5-Low voltage wire of power supply
6-Voltage wire of discharge switch
7-Ground wire

Discharge switch in the unit

It is necessary to discuss how the discharge switch is working in the 200T unit. When the front panel (Air intake) is closed the bottom portion of the front panel will push down the switch so that the voltage wire plate is separating from the ground plate (Fig. 3.4-1), meaning if the front panel is closed the discharge switch does work (Fig.3.4-3). However, when the front panel is opened, the switch lever will spring out and the voltage plate connects the ground plate so the cell electrostatics will be discharged through the ground wire of the discharge switch (Fig. 3.4-4).

To completely discharge the cell, the discharge switch must start to work before the cell power contact terminals leave from the unit power contact terminals. If the switch lever is too long the switch will not work even you already pulled out the cell from the front panel. If the switch lever is too short, when the front panel is closed, there will be a spark between the voltage plate and ground plate inside the discharge switch. The space between the voltage plate and ground plate should be kept more than 7 mm to avoid the sparks.

There are two ways to solve above problem:

1. Install the switch further to the back of the unit so that the switch works before the cell leaves from the unit power contact terminals (Fig. 3.4-5).
2. Secure the unit power contact board to the front panel so that the cell always contacts the terminals. However, it will be not easy to remove the front panel when you try to replace the UV lamp because of the wire connections on the unit power contact board.

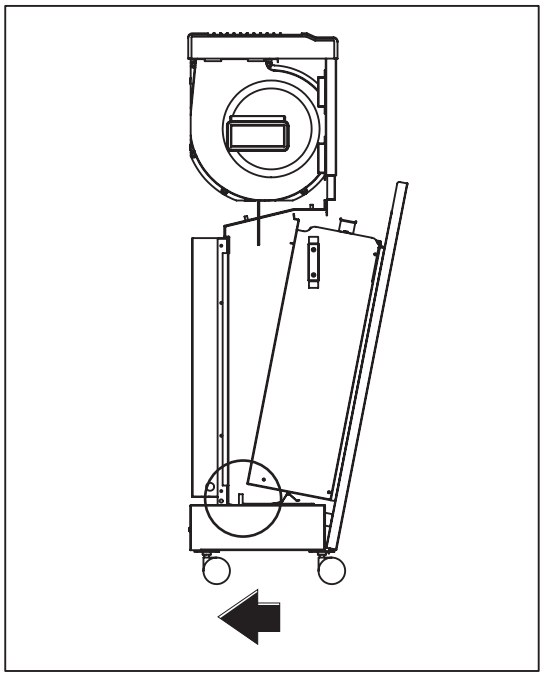


Fig. 3.4-5 Move the switch to the back of the unit.

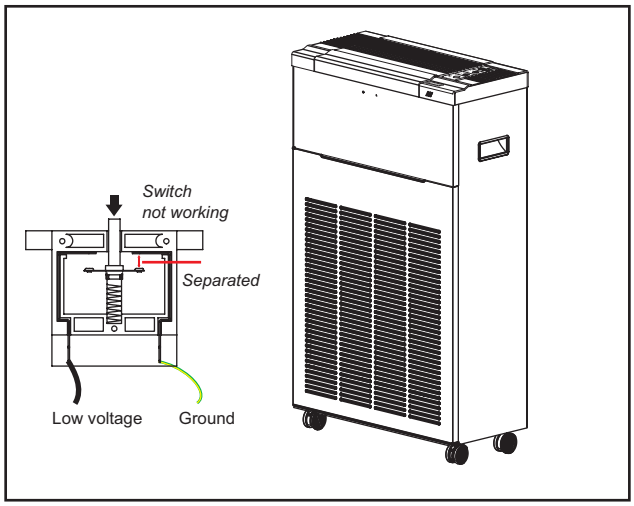


Fig. 3.4-3 Discharge switch does not work.

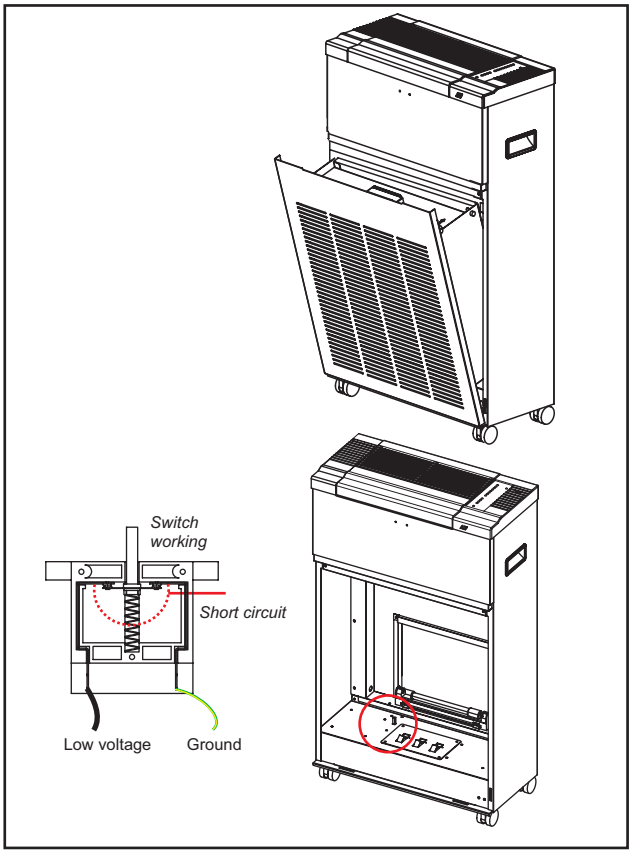


Fig. 3.4-4 Discharge switch discharges the cell.

ENGLISH

3.5 ODOR SENSOR (GAS SENSOR)

The unit comes with an odor sensor. The odor sensor can sense smoke, ammonia, benzene and alcohol. In fact, the odor sensor continuously monitors the air quality through the sensor window on the plastic control panel cover as long as the unit is plugged in. The odor sensor is connected to the circuit board. The odor sensor will send signals to the main circuit board through the display circuit board wire (Fig. 3.5-1).

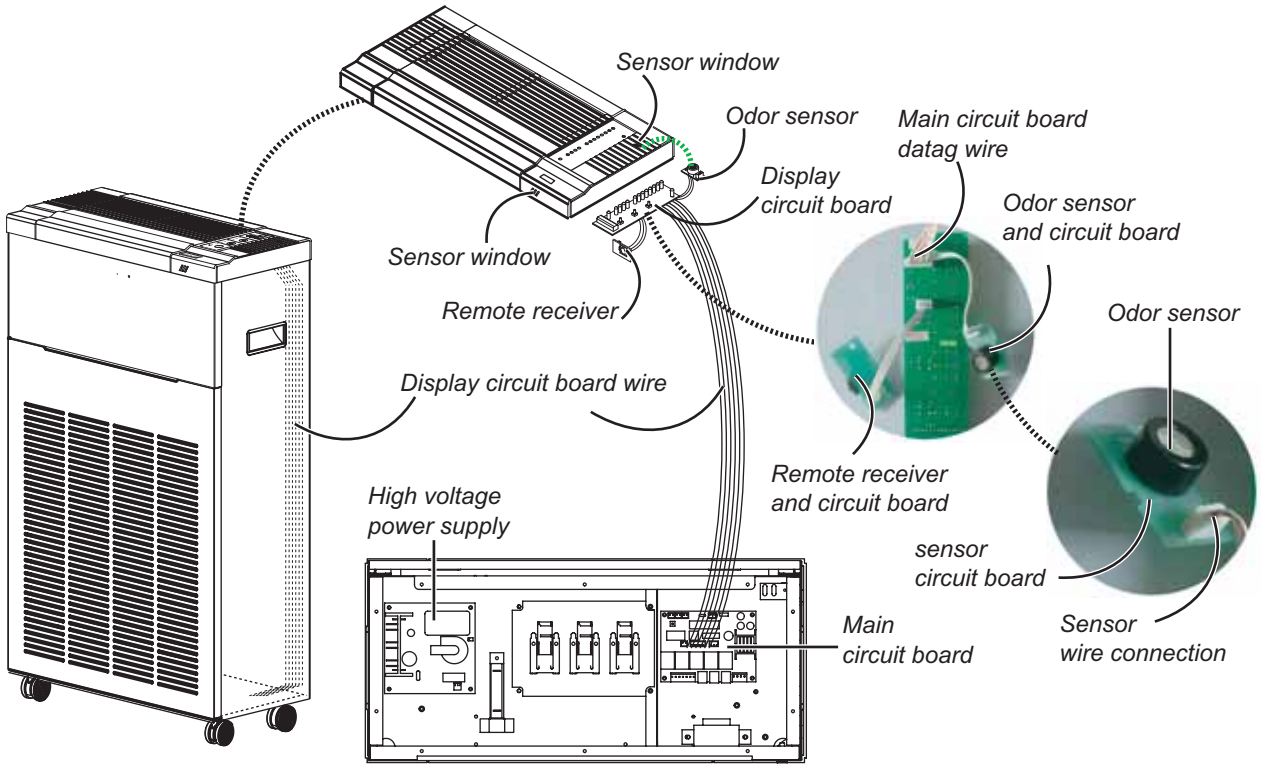


Fig. 3.5-1 The odor sensor circuit board is connected to the back of the display circuit board. The odor sensor continuously monitors the air quality through the sensor window and sends signals to the main circuit board through the display circuit board wire.

When the odor sensor does not work properly

The odor sensor sensitivity is adjusted by the manufacturer. If the sensor does not work correctly, you will need to change the sensor or the main circuit board. The warranty time for odor sensor is 2 years.

An important notice:
*For customer convenience the sensor working process was redesigned from the new machines (**From ser. # R200xxE**) so you do not need to adjust the odor sensitivity. The sensor will automatically adjust its sensitivity at different atmosphere.*

Specifications
Target gas: NH3, Benzene, Alcohol, Smoke
Detection Range: 10~300ppm(NH3), 10~1000ppm (Benzene), 10~600ppm (Alcohol), 1%~10% (Smoke)
Sensing Resistance: 2~500KΩ
Response Time: 10s (70% Response)
Resume Time: 30s (70% Response)
Heating Resistance: 31±3Ω
Heating Voltage: 5V±0.2V
Standard Working Condition: 10 °C~65 °C / 95% RH

Odor sensor and air speed
After warming up for 3 minutes, the sensor resistance of the sensor has its initial data (Ω). This resistance data will decrease as it begins to contact the gases around it.
At Auto mode, if the data is getting down to 6.25% of the initial date, the circuit board will control the fan to run at Low speed and the data decreased to another 6.25% of the low speed data the unit will start to run at medium speed. Finally, If date decreased to a 6.25% of the medium speed date, the fan will run at High speed.

ENGLISH

3.6 FAN MOTOR

Electric motor and capacitor

Electric motors can be divided into two types: Alternating Current (AC) motors and Direct Current (DC) motors. A DC electric motor will not run when supplied with AC current, nor will an AC motor run with DC current.
AC motors are further subdivided into single phase and three phase motors. Single phase AC electrical supply is what is typically supplied in a home. Three phase electrical power is commonly only available in a factory setting.
The most common single phase AC motor is known as a universal motor. This is because this motor can also run with DC current. For larger single phase AC motors, a electrical component known as a capacitor is used to create a second phase from the single phase AC current. This type of AC motor is known as an induction motor and there are two basic types; a capacitor start motor and a capacitor run motor. The capacitor is used to create a second phase from the single phase power source and it is the interaction between these two phases that causes the motor to turn. This introduction of a second phase eliminates the need for the brushes used in a universal AC motor. This greatly increases the both the efficiency of the AC motor and increases the life expectancy of the AC motor as brushes are a major source of wear and failure. AC motors also come with various speed ratings. Speed is usually specified as rotations per minute (RPM) at no load condition. As the motor is loaded down, the speed will slow down. When the AC motor is running at its rated power draw, the speed of the shaft measured in RPM is the full load speed. If the electric motor is loaded too heavily, the motor shaft will stop. This is known as the stall speed and should be avoided.

The capacitor, or condenser as it is sometimes called, in an electric motor provides a time delay on the power arriving at the start windings of the motor to make the motor start. The start or auxiliary windings are inserted in the motor at an angle to the run or main winding. This creates a starting torque - basically something to make the rotor want to rotate. If you ever need to replace the capacitor, always make sure you replace it with the same micro farad (uF) rating. Induced voltages from the motor windings result in voltage across the capacitor that is higher than the supply voltage. The actual value depends upon the supply voltage, the motor windings & the load. Motors driving pumps at full load would typically see capacitor voltages between 320- 440 volts.

Fan motor system of the unit

After removing the plastic air outlet top cover, you can see the fan motor system. The fan motor system is composed of two fan housings and radial type fan blades, single phase AC motor and capacitor. To increase the particle removal capability and decrease the noise levels, the motor system is changed as follows (Fan motor system-A and Fan motor system-B).

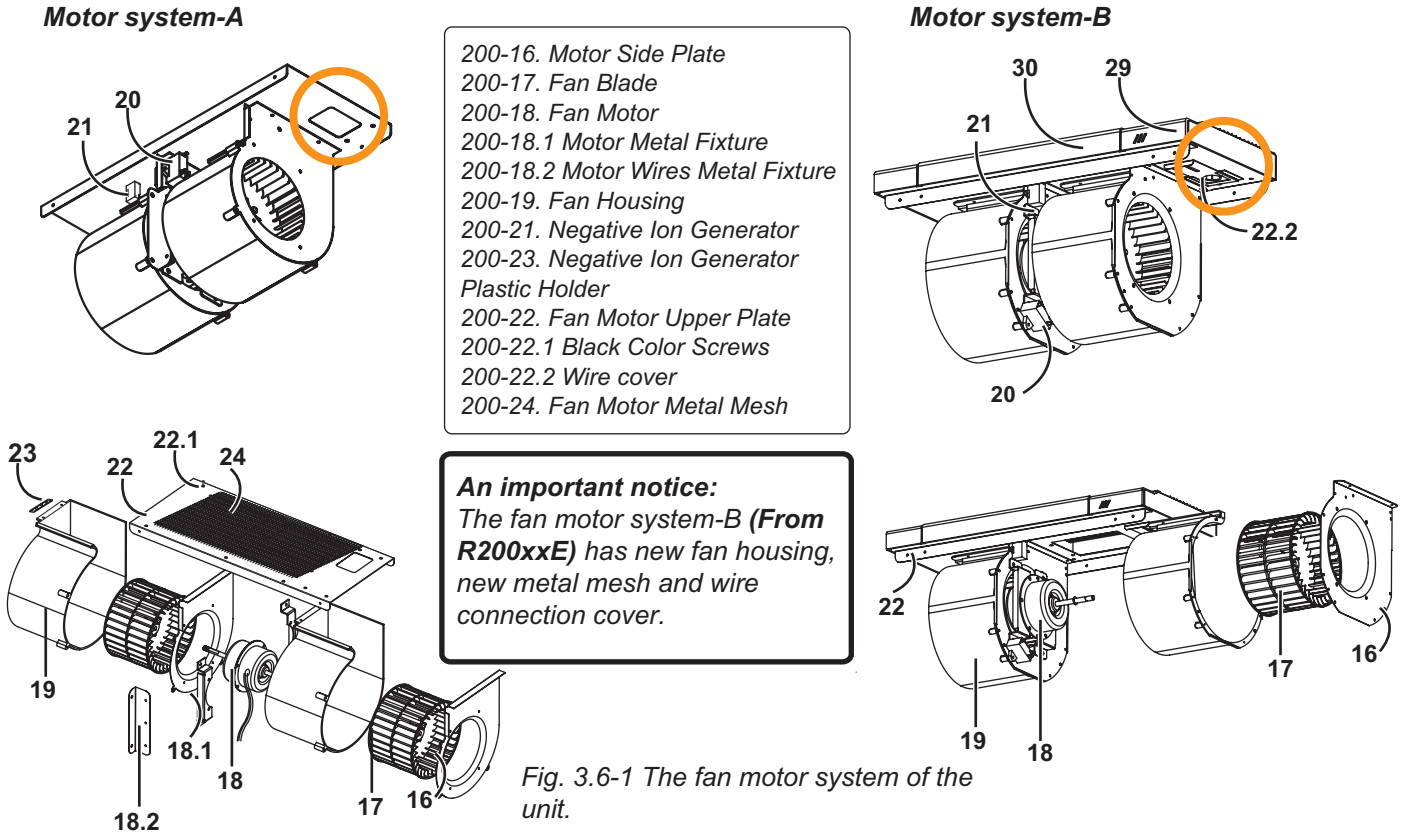
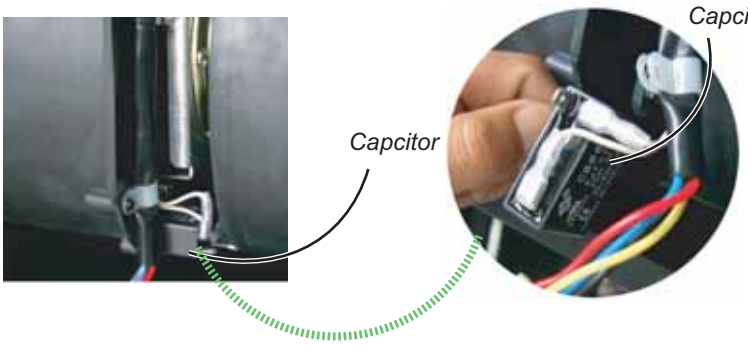


Fig. 3.6-1 The fan motor system of the unit.

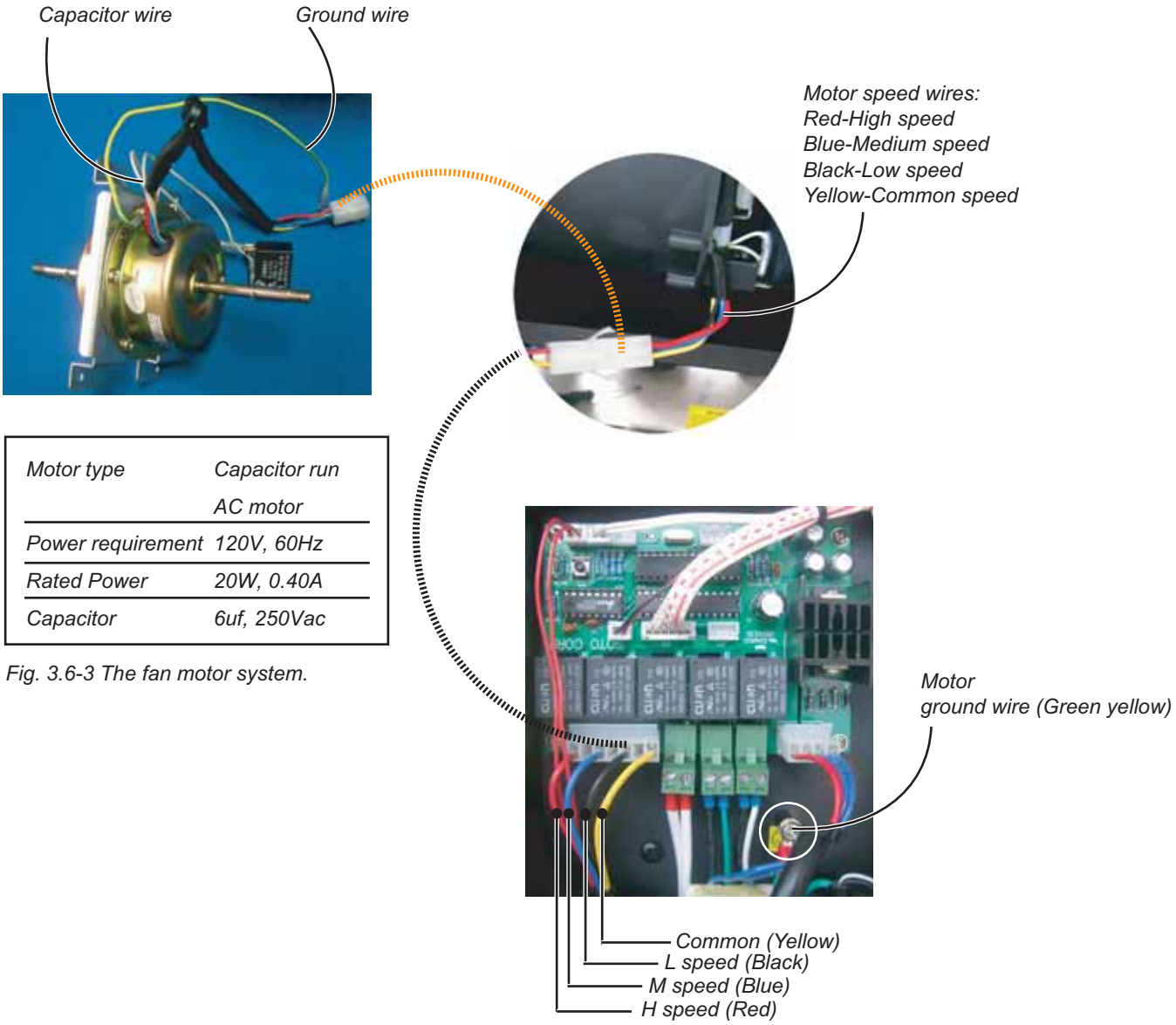
The motor capacitor is secured to the left fan housing side plate by one screw (Fig. 3.6-2).



CBB61
6uf±5%
250V ac
50/60Hz

Fig. 3.6-2 The Motor capacitor is secured at the left fan housing metal plate by one screw.

The motor has 7 electrical wires: two white color wires are for capacitor, one green-yellow color for ground and the rest four wires are for High speed (Red), Medium speed (Blue), Low speed (Black) and for common (Yellow). See Fig. 3.6-3. The four speed wires are connected to the main circuit board and the ground wire is grounded firmly with power cord ground wire by a screw and nut.



Motor type	Capacitor run AC motor
Power requirement	120V, 60Hz
Rated Power	20W, 0.40A
Capacitor	6uf, 250Vac

Fig. 3.6-3 The fan motor system.

ENGLISH

3.7 SPEAKER

The speaker of the unit produces melody when you start unit, press the buttons or shut off the unit. The speaker is composed of speak, speaker wire and connector. The speaker is located in the speaker holder and attaches to the unit case by its magnetic. The speaker wire is connected to the main circuit board (Fig. 3.7-1). If the unit is no melody, you should check if the speaker wire connection is connected loosened or replace the speaker. The speaker will be interfered by any sparks from cell or power contact terminals.

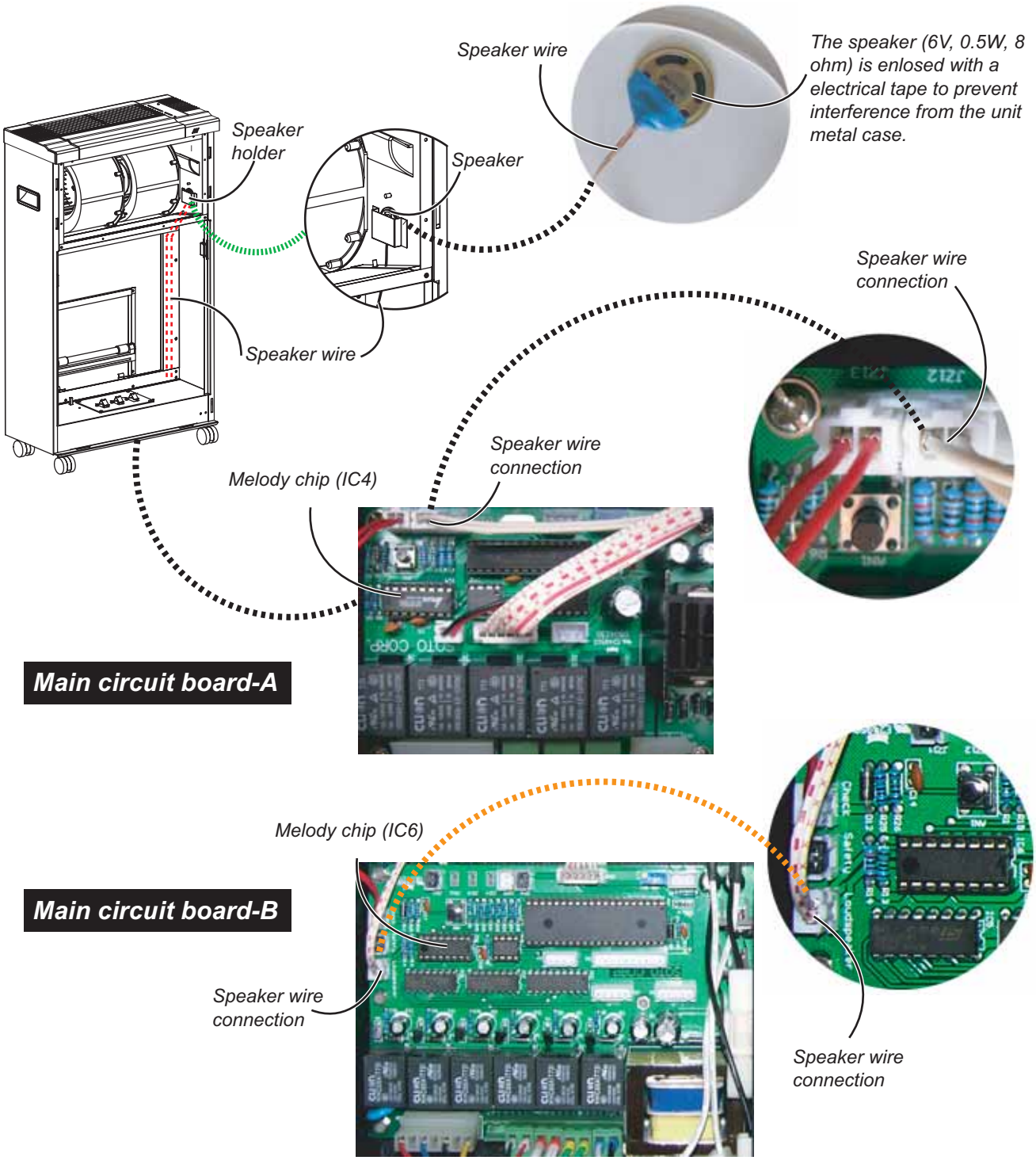
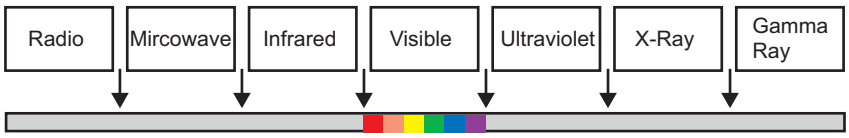


Fig. 3.7-1 The speaker and main circuit board.

ENGLISH

3.8 REMOTE CONTROL

Generally, there are two types of remote controls: infrared (IR), and radio frequency (RF). Infrared remote controls work by sending pulses of infrared light to a device, while RF remote controls use radio waves in much the same way.



Infrared light is also known as plain-old "heat." The basic premise at work in an IR remote control is the use of light to carry signals between a remote control and the device it's directing. Infrared light is in the invisible portion of the electromagnetic spectrum. An IR remote control (the transmitter) sends out pulses of infrared light that represent specific binary codes. These binary codes correspond to commands, such as Power, Speed or Timer. The IR receiver in the device decodes the pulses of light into the binary data (ones and zeroes) that the device's microprocessor can understand. The microprocessor then carries out the corresponding command. The basic parts involved in sending an IR signal include: Buttons, Integrated circuit, Button contacts and Light-emitting diode (LED).

Remote control work process

Pushing a button on a remote control sets in motion a series of events that causes the controlled device to carry out a command. The process works like this: You push the "Speed" button on your remote control, causing it to touch the button contact beneath it and complete the "Speed" circuit on the circuit board. The integrated circuit detects this. The integrated circuit sends the binary "Speed" command to the LED at the top of the remote. The LED sends out a series of light pulses that corresponds to the binary "Speed" command. The remote signal includes more than the command for "Speed" though. It carries several chunks of information to the receiving device, including: a "start" command, the command code for "Speed", the device address, a "stop" command (triggered when you release the "Speed" button).

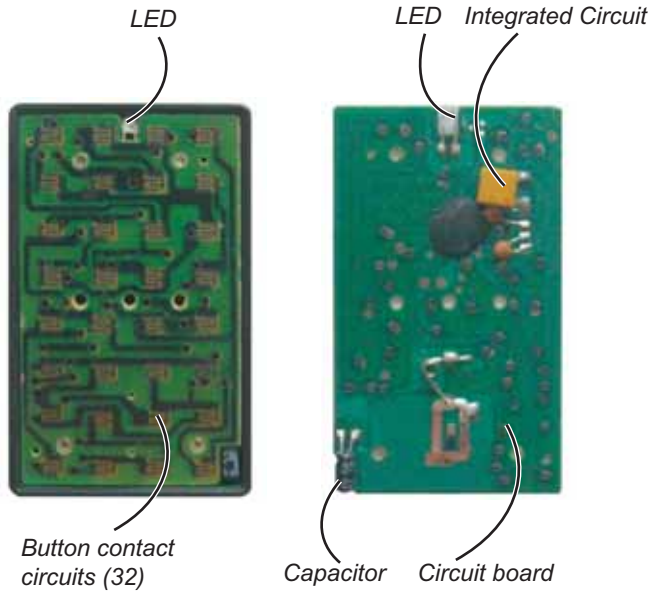


Fig. 3.8-1 Remote control circuit board (3V dc).

The unit remote control

The unit applies a thin remote control. The backside of the keypads contacts are painted and coating with conductive materials. When the painted coating touches the button contact circuit on the remote circuit board, the LED at the top of the remote send out infrared light signal to the unit remote receiver so that the microprocessor can carries out the corresponding command (Fig. 3.8-2). If the button cannot be released after pressing, the remote control does not work. The reason is signal is not stopped and can not send out other signals you desired.

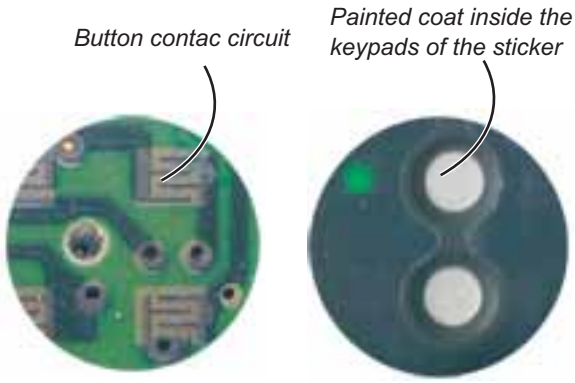
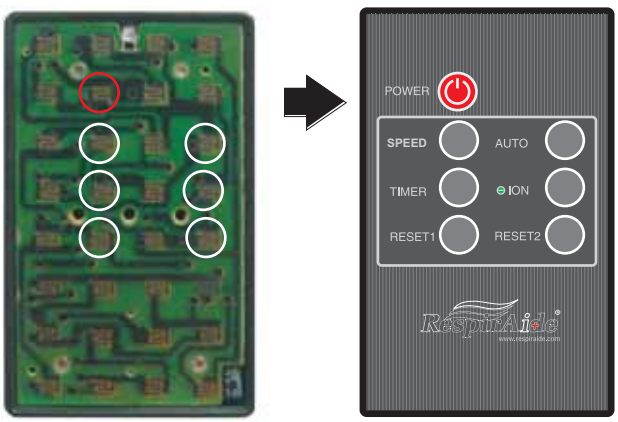


Fig. 3.8-2 The remote control button contacts and painted conductive coating in the backside of the sticker.



ENGLISH

PART IV
DISPLAY PANEL OF THE UNIT

CONTENTS

ENGLISH

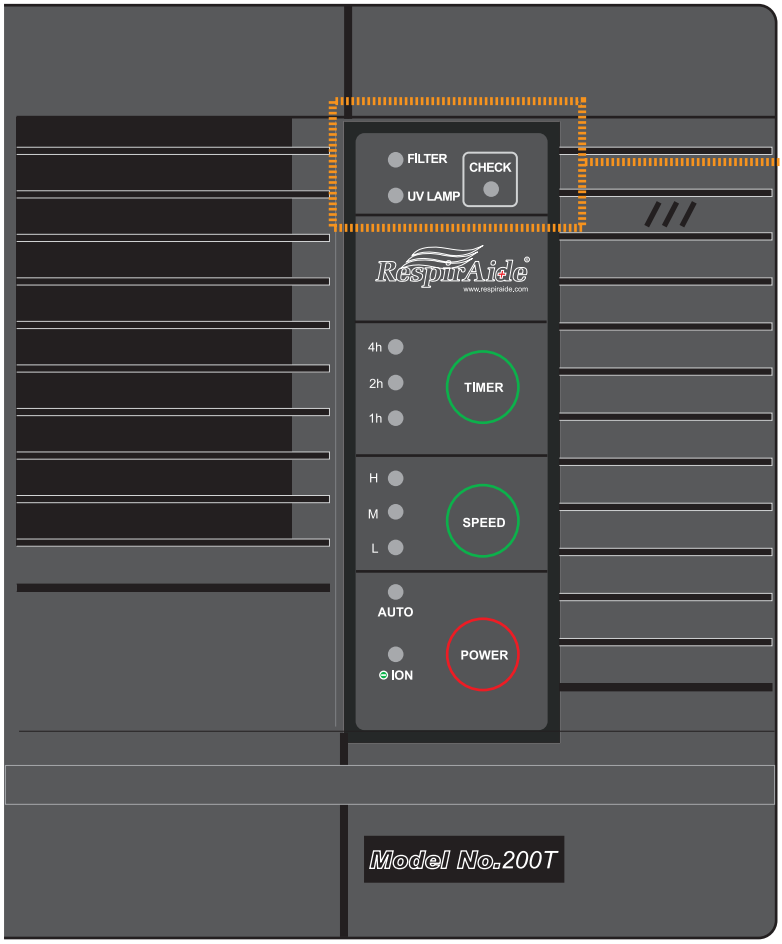
RespirAide®

PART IV DISPLAY PANEL OF THE UNIT

4.1 DISPLAY INDICATOR LIGHTS AND BUTTONS

The unit has a display panel on the control panel, displaying the current operating modes.

1. Displays what speed the system is operating on.
2. Built-In off timer: 1hour, 2hours and 4hours off timer.
3. Negative ion indicator light is on when the ions being emitted.
4. When the Auto indicator light is on, the unit will select the correct fan speed automatically according to the air pollutant level the sensor detected.
5. The FILTER and UV LAMP indicator lights monitor for both activated carbon filter and UV lamp life and remind when it's time to replace them.
6. When problems occur in the cell-power supply system the CHECK light will flash red with warning beeping sound.



FILTER Indicator Light
When the "FILTER" light flashes red, the activated carbon filter needs to be replaced.
UV LAMP Indicator Light
When the "UV LAMP" light flashes red, it tells the time for UV lamp to be replaced.
CHECK Indicator Light
Once the "CHECK" indicator light flashes red, a check up for cell-high voltage power supply system is required.

Note: When the power is connected, the "CHECK" indicator light will turn green and when the unit starts to run, it will go out.

Fig. 4.1-1 The display panel of the unit. When you plug the power cord into the wall outlet all the indicator lights will flash for 2 seconds with a melody. If you find some indicator lights are incorrect you will need to figure out the causes before operating.

ENGLISH

Connect the power
When the power plug is inserted into the wall outlet all the indicators on the display panel will light up for 2 seconds.
Operating the unit
Press the POWER (ON/OFF) button to start operating the unit. Pressing the button again will stop operation.
Manually switch the airflow rate
Each time the SPEED button is pressed the airflow rate changes as shown below:
L (Low) ------ M (Medium) ------ H (High) ------AUTO (Automatically operate) ------ L (Low) ...
Setting the operation time
Press the "TIMER" button to select the time for operation. Each time it is pressed the timer setting switches as shown below:
"1h"---"2h"---"4h"--- (Cancel)
NOTE: When the set time is reached, the operation will automatically stop. The set time can be changed if the button is pressed while the time is operating.
AUTO Operation
The fan speed is automatically switched (HIGH, MEDIUM, LOW) depending on the amount of pollution in the air. The sensor detects the pollution and automatically sets the fan speed for efficient air purification.
NOTE: At automatic mode, the indicator light turns yellow and if SPEED button is pressed the desired fan speed is activated.

Switch the airflow rate

When the power plug is inserted into the wall outlet all the indicator lights on the display panel will light up for 2 seconds with a melody from the speaker (Fig. 4.1-2). If some indicator lights do not light up you will need to check the display circuit board.

When the melody stops the CHECK light will turn green (Fig. 4.1-3).If you press the POWER button on the control panel the air flow rate will be switched to Low air flow and the L indicator light will turn yellow. Pressing the SPEED button it will go to Medium air flow with the yellow M light, and than to High air flow rate with the red color H indicator light . If you press the SPEED button again, it will go to AUTO mode, the AUTO indicator light will turn yellow.
The airflow rates (Fan motor speeds) change as shown below:
Low - Medium - High - AUTO mode - Low--- (Fig. 4.1-4). For more information, see **3.6 FAN MOTOR**.

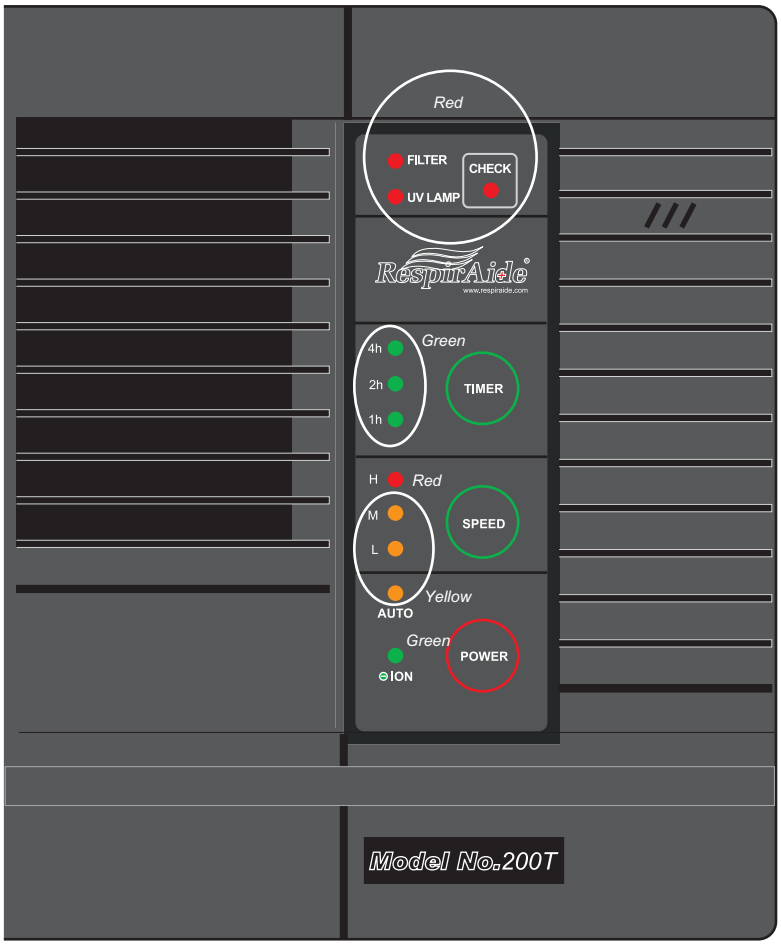
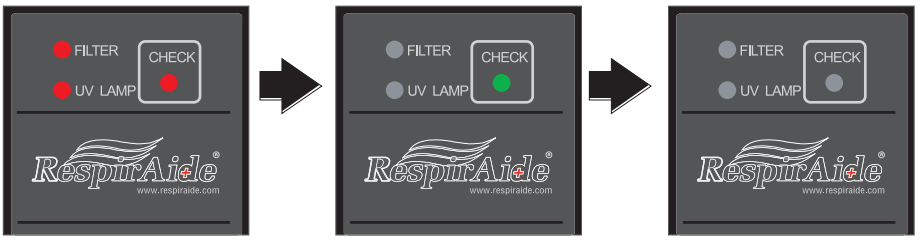


Fig. 4.1-2 When the power plug is inserted into the wall outlet all the indicator lights on the display panel will light up for 2 seconds to check all indicator lights are OK (Note the CHECK light is red).

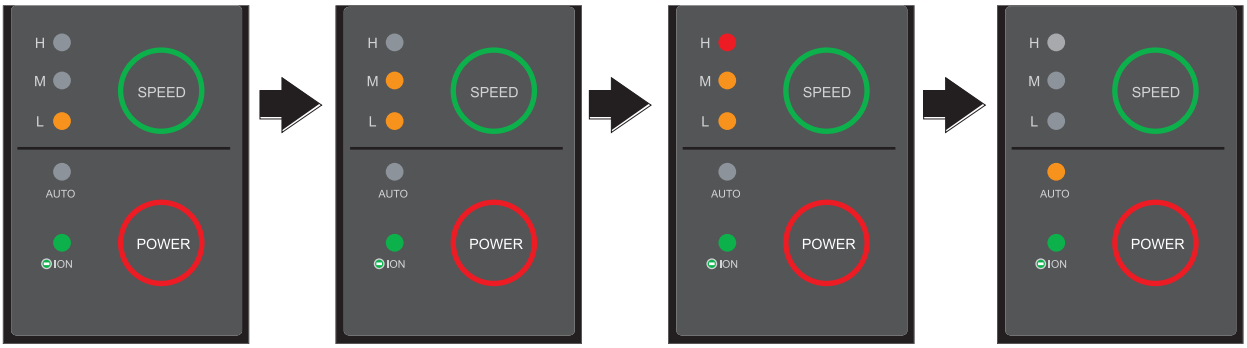


When the power plug is inserted into the wall outlet...

After the melody stops...

When the POWER button is pressed...

Fig. 4.1-3 After the unit start melody stops the CHECK light will turn green and when the POWER button is pressed the CHECK light will go out.



Pressing the POWER button...

Pressing the SPEED button once...

Pressing the SPEED button twice...

Pressing the SPEED button three times...

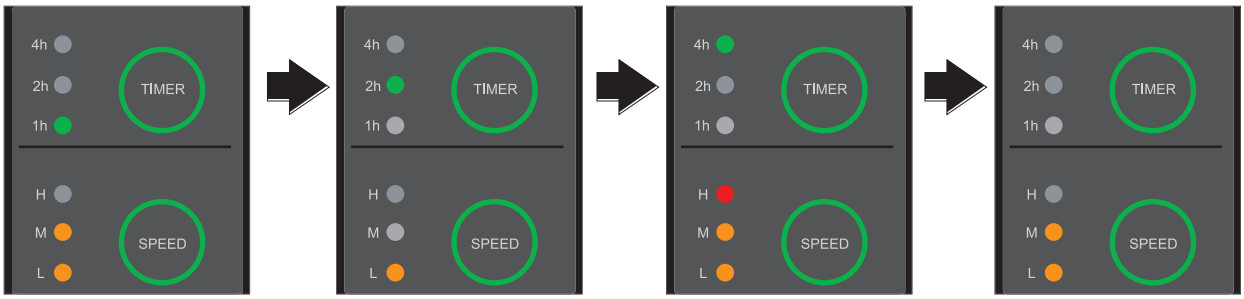
Fig. 4.1-4 The indicator lights for the different air flow rates and Auto mode.

Setting the operation time

Press the "TIMER" button to select the time for operation. Each time it is pressed the timer setting switches as shown below with green indicator light:

"1h"---"2h"---"4h"--- (Cancel)

Note: When the set time is reached, the operation will automatically stop. The set time can be changed if the button is pressed while the time is operating. At AUTO mode, you also can set the operation time.



Pressing the TIMER button once... | *Pressing the TIMER button twice...* | *Pressing the TIMER button three times...* | *Pressing the TIMER button four times...*

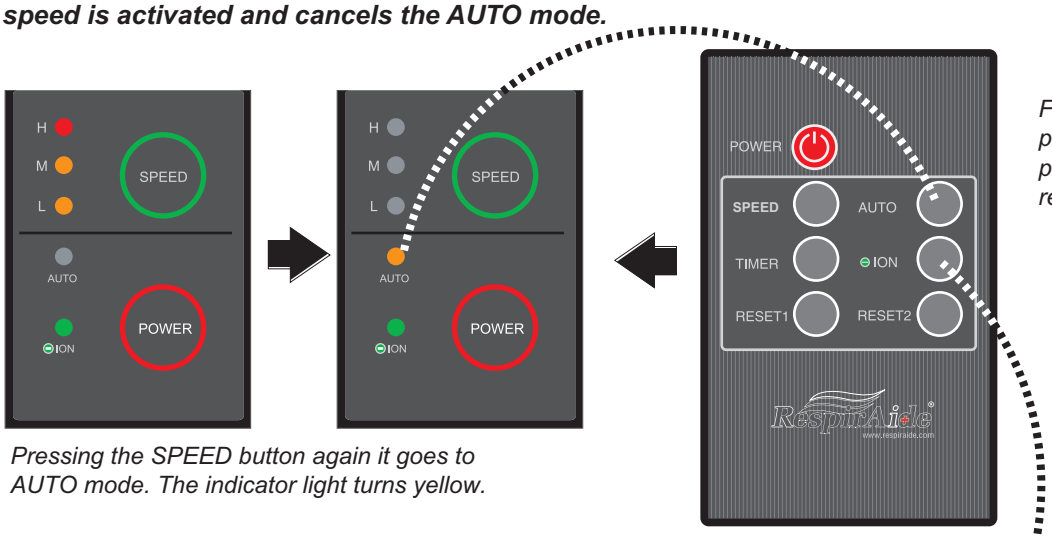
Fig. 4.1-5 Set the operation time. You can also change the air flow rate by pressing the SPEED button after the operation time is set.

AUTO operation

When you press the SPEED button for four times the unit will be set at AUTO mode and the AUTO indicator light will turn yellow. You also can push the AUTO button on the remote control to set the unit at AUTO mode (Fig. 4.1-6).

At AUTO mode, the fan speed is automatically switched (HIGH, MEDIUM, LOW) depending on the amount of pollution in the air. The sensor detects the pollution and automatically sets the fan speed for efficient air purification.

Note: At automatic mode, the indicator light turns yellow and if you press the SPEED button the desired fan speed is activated and cancels the AUTO mode.



Pressing the SPEED button again it goes to AUTO mode. The indicator light turns yellow.

Fig. 4.1-6 Set the AUTO mode by pressing the SPEED button or pushing the AUTO button on the remote control.

Negative ion discharge

When the POWER button is pressed the ION indicator light will be green and negative ions are discharged. The negative ion generation is controlled by remote control. One press of the "ION" button on the remote control will stop the generation of ions and the light will go out (Fig. 4.1-7).

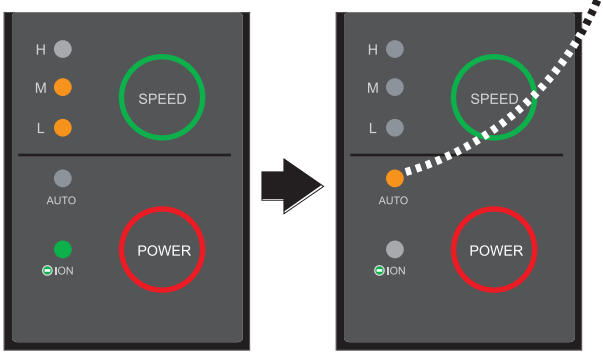


Fig. 4.1-7 Control the negative ion generation by remote control.

An important notice: *For the new machines starting with* ***ser. # R200xxE****, when the unit is set at AUTO mode, the unit will run at Low speed regardless of the air pollutant level in the air. As the air pollutant increases the sensor just puts the fan speed at Medium speed and will not run at High fan speed.*

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FILTER and UV LAMP indicator lights
It is hard to decide when the activated carbon filter should be replaced. The reason is the different atmosphere needs the different time for filter replacement. To assure optimum performance of the unit, it is recommended that the activated carbon filter should be replaced regularly. The time for replacement will vary depending on the number of family members, pets, activities (such as cooking or woodworking) and smoking habits. To remind customers to replace the activated carbon filter and UV lamp regularly, the unit has FILTER and UV LAMP indicator lights on the display panel.
The time for activated carbon filter and UV lamp replacement is set by the manufacturer.

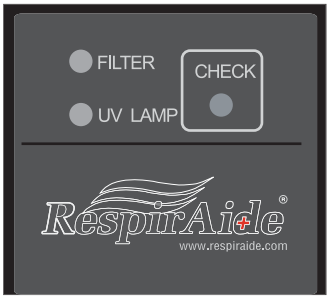

Fig. 4.1-8 The FILTER and UV LAMP indicator lights on the display panel.

FILTER indicator light
When the FILTER indicator light flashes, the carbon filter needs to be replaced. The indicator light will flash until you replace the activated carbon filter and reset the unit to initiate the time for the new carbon filter (Fig. 4.1-9).

An important notice:
When the "FILTER" indicator light flashes in red, the unit has 50 hours of operation remaining. If you do not reset the activated carbon filter life within this 50 hours the unit will shut off automatically.

However, for the new units ***(From ser. # R200xxE~)*** *the remaining 50 hours are cancelled. The "FILTER" indicator light will flash without shutting off the unit automatically just for reminding the customer to replace the activated carbon filter.*

Fig. 4.1-9 When the FILTER indicator light flashes in red it is time to replace the activated carbon filter.

UV LAMP indicator light
When the UV LAMP indicator light flashes, it is time to replace the UVC germicidal lamp (Fig. 4.1-10). The time for UV lamp life is decided by the manufacturer.

An important notice:
When the "UV LAMP" indicator light flashes in red, the unit has 50 hours of operation remaining. If you do not reset the UV lamp life within 50 hours the unit will shut off automatically.

However, for the new units ***(From ser. # R200xxE~)*** *the remaining 50 hours are also cancelled. The "UV LAMP" indicator light will flash but does not shut off the unit just for reminding the customer to replace the UVC lamp.*

Fig. 4.1-10 When the UV LAMP indicator light flashes the UVC lamp needs to be replaced.

CHECK indicator light
When a problem occurs in the cell-high voltage power supply system, the "CHECK" indicator light will flash with warning beeping sound. (Fig. 4.1-11). For more information, see **5.2 CHECK INDICATOR LIGHT FLASHING**.

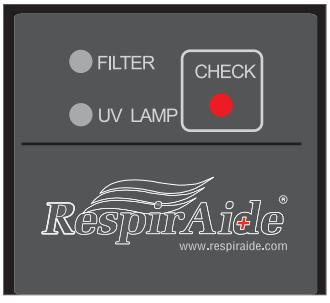

Fig. 4.1-11 If a problem occurs with the cell-power supply system the CHECK indicator light will flash with beeping.

ENGLISH

4.2 HOW TO RESET THE ACTIVATED CARBON FILTER AND UV LAMP

After replacing the activated carbon filter or UV lamp, you will need to reset them, otherwise the indicator lights will flash continuously without stopping. In the old model, the unit will automatically shut off until you reset them. There are two ways to reset the unit.

Using the remote control

There are RESET1 button (for activated carbon filter reset) and RESET2 button (for UV lamps reset) on the remote control (Fig. 4.2-2).

To reset activated carbon filter or UV lamp replacement, you need to push the RESET1 for 12 times or press the RESET2 button 12 times. When the filter or UV lamp is reset you should hear a beep sound from the unit and the replacement light goes out (Fig. 4.2-1~2).

Note:

When you are trying to reset the FILTER or UV LAMP indicator light the unit must be on.

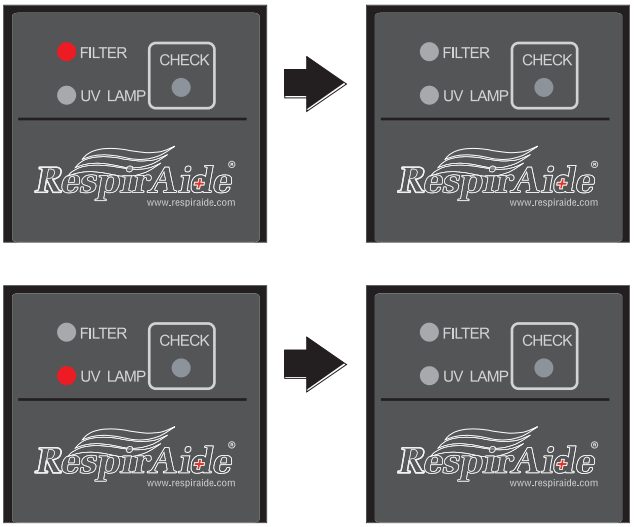

Fig. 4.2-1 When the replacement indicator lights are reset the FILTER or UV LAMP indicator lights will go out.

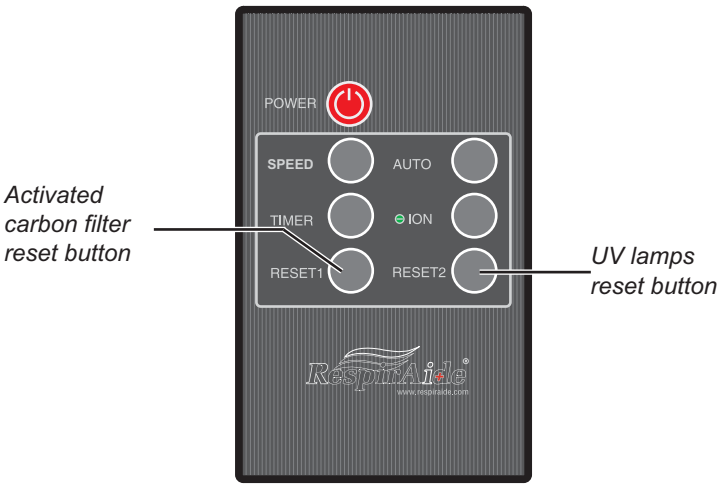

Fig. 4.2-2 Press the RESET buttons for 12 times continuously to reset the replacement indicator lights.

An important notice:

*In the new machine (**From ser. # R200xxE**), the "FILTER" and "UV LAMP" indicator lights will be reset jut pushing the RESET1 or RESET2 button for 5 times continuously.*

Pushing the reset button on the main circuit board

If you do not have the remote control on your hand or you failed to reset the unit with remote control, you can reset the filter and UV lamp by pushing the reset button on the main circuit board. Open the bottom plate of the unit and push the reset button on the circuit board.

Once press of the reset button will reset the activated carbon filter, pressing and holding the reset button will reset the UV lamp. If the carbon filter or UV lamps are reset you can hear a beep sound and the FILTER or UV LAMP indicator light will stop to flash (Fig. 4.2-3). For information, see **5.7 FILTER AND UV LAMP RESET PROBLEM**.

Notice: When you are trying to reset the unit by pushing the reset button the unit has to be on. Do not touch any parts of the circuit board or wires with your hands when you push the reset button on the main circuit board.

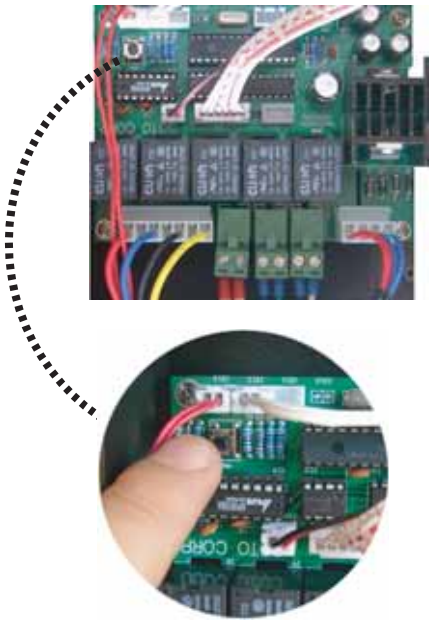

Fig. 4.2-3 The reset button on the main circuit board.

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PART V
TROUBLESHOOTING

CONTENTS

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REQUIRED TOOLS AND OPEN THE BOTTOM PLATE

In order to fix the problems listed, you need to prepare the following necessary tools. All tools can be purchased at Canadian Tire.

1-Flat head screwdriver
2-Phillips screwdriver
3-Nut screwdriver (M3)
4-Needle-nose pliers
5-Wire cutter
6-Ohmmeter
7-High voltage probe
8-Nut wrench
9-Hot glue gun
10-Hammer drill
11-Rivet gun
12-Soldering iron
13-Wire ties

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To reduce risk of electric shock, it is extremely important to stop the operation and unplug the power cord before checking the unit or replacing any parts. In order to fix the some problems, you will need to open the bottom plate. When you open the bottom plate, remember to discharge the unit power contact terminals by creating a short circuit before you touching them. If not, an electrical shock may occur.

1. Lay down the unit horizontally with unit bottom led facing toward you. Unscrew the 10 screws located on the bottom of the unit with Phillips screwdriver.

2. Create a short circuit between high voltage terminal and a screw on the bottom with screwdriver.

3. Create a short circuit between low voltage terminal and ground terminal with screwdriver.

5.1 NO POWER

When the unit is plugged in, there are no display indicator lights on the control panel and no melody. The buttons and remote control do not start the unit.

Fig. 5.1 Required tools.
1-Ohmmeter
2-Phillips screwdriver
3-Flathead screwdriver

Most of time, this problem occurs with the interlock switch breakdown. However, there are other reasons. In order to make sure what causes this problem, you will have to prepare yourself for some electrical work, have the necessary tools ready and proceed with the following steps.

The Troubleshooting Chart

To use this chart:
1. Follow the steps in order. Don't skip around.
2. Each time you isolate and fix a problem, go back to START.
3. Repeat all the steps until the air purifier checks out OK.

⚠ WARNING
Some of these steps expose dangerous high voltage. Only qualified service technician should attempt this procedure.

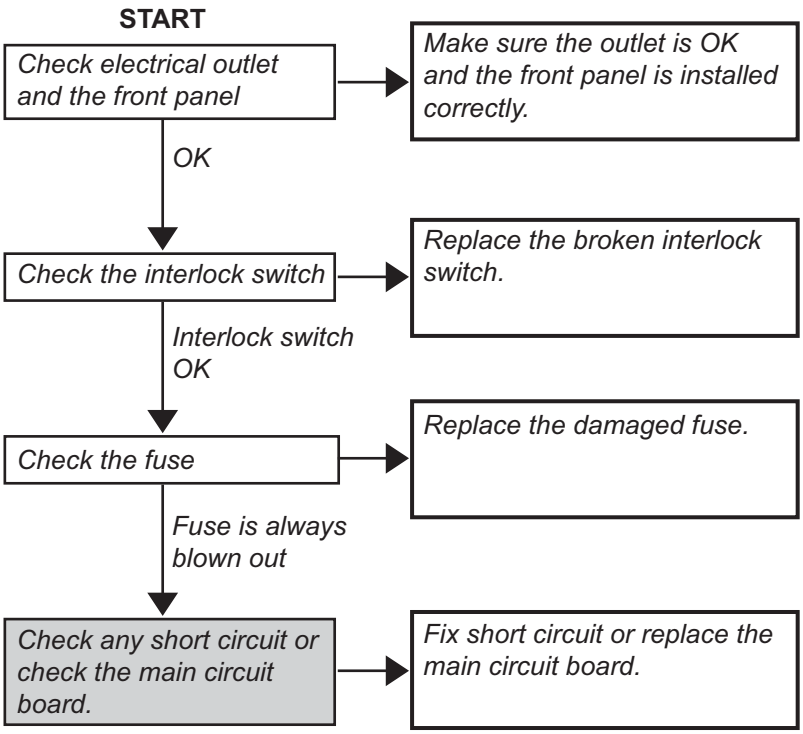

Fig. 5.2 Troubleshooting chart for NO POWER

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5.1.1 Check the electrical outlet and the front panel (Air Intake)

Sometimes, the unit does not operate because of the electrical outlet failure. Make sure the power plug is inserted into the wall outlet correctly, or try to reinsert the power plug (5.1.1-1). Check if other electrical appliances using the same electrical outlet are working.

Fig. 5.1.1-1 Make sure the power plug is tightly inserted into the outlet .

If the electrical outlet is correct, go head and check the front panel. There is an actuator at the right bottom inside the front panel (Fig. 5.1.1-2). The actuator must push down the two levers of the twin interlock switch to operate the unit. If the front panel is detached or the actuator is deformed the unit does not work. Make sure the front panel is installed properly and there are no dents or bends which would refrain from closing the front panel correctly.

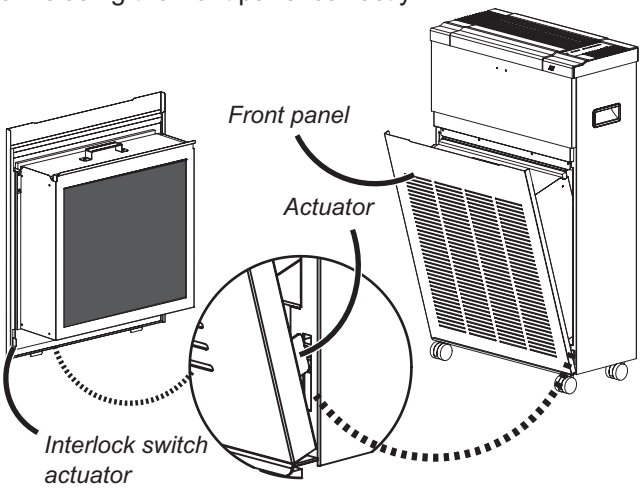
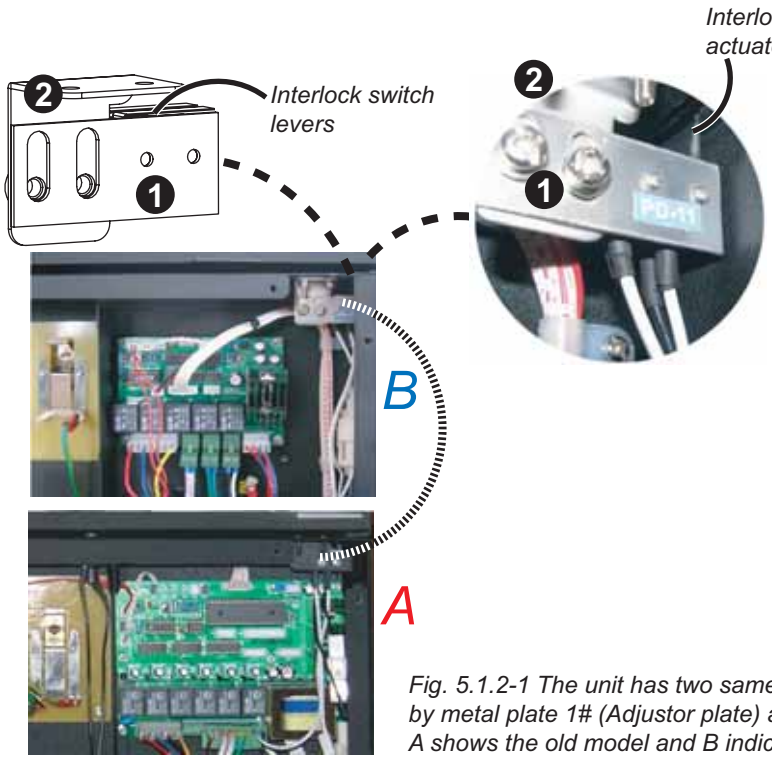


Fig. 5.1.1-2 Make sure the front panel is installed correctly so that the actuator is able to push down the levers of the interlock switches. If the actuator is deformed, some adjustment is needed in order for the front panel to close the switches correctly.

5.1.2 Check the interlock switches

The unit comes with twin interlock switches to interrupt the unit operation when the front panel is opened by accidence (Fig. 5.1.2-1). One switch is to interrupt the power cord Live line (White color) and the other is to interrupt the Neutral wire (Black wire). It is important that the actuator must push down the two levers of the twin switches at the same time to operate the unit. If one or two of them is not closed down or broken the unit will be no power. When you check the interlock switches, open the bottom plate and visually check if the twin switches are damaged. If they are cracked down by the actuator, replace the switches (See **6.1 REPLACE THE INTERLOCK SWITCHES**). If the switches are OK, go ahead to check the fuse.



While the unit is on, do not touch any electrical wires with hands, especially the main circuit board, power supply circuit board and the unit power contact terminals!

Fig. 5.1.2-1 The unit has two same interlock switches which are put together by metal plate 1# (Adjustor plate) and secured to the bottom by metal plate 2#. A shows the old model and B indicates the new model machines.

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5.1.3 Check the fuse

Now that the interlock switches are no problem, you should go ahead to check the fuse.

Remove the fuse and visually check it

- The fuse holder is located on the back of the unit. In some units, you will need to remove the front panel to find the fuse holder which is located on the bottom of the unit (Fig. 5.1.3-1~2).
- With a flat screw driver, open the fuse holder cover and remove the fuse. When opening the fuse holder cover (socket), you need to push it down and gently rotate it until it is pulled out.
- Taking out the fuse, visually check if it is damaged. If it is damaged, replace it with 125Vac, 2A new fuse. A spare fuse can be found in the operation manual plastic bag (See **6.11 REPLACE THE FUSE**) .
- If you are not sure if the fuse is blown out you can check with ohmmeter.

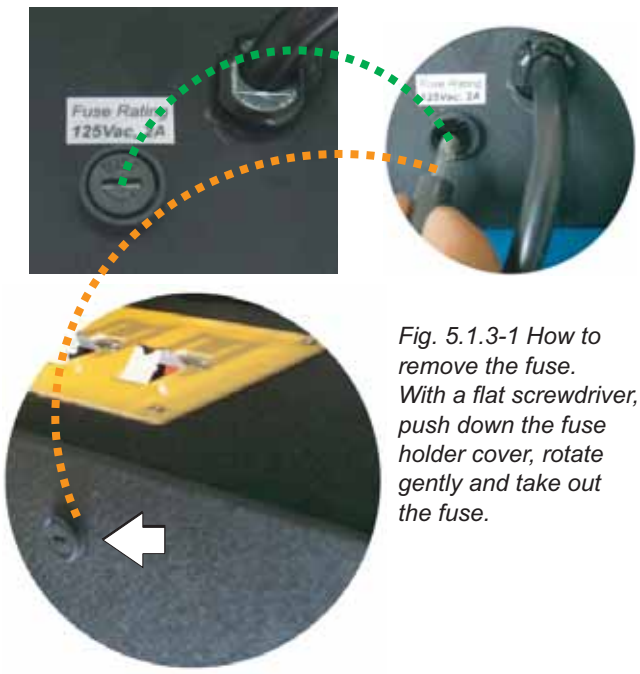

Fig. 5.1.3-1 How to remove the fuse. With a flat screwdriver, push down the fuse holder cover, rotate gently and take out the fuse.

Check the fuse with ohmmeter

- Set the ohmmeter in ohm range of 200 ohm or like the below range (Fig. 5.1.3-3).
- Place the black and red from the ohmmeter to each end of the fuse (Fig. 5.1.3-4).
- If the reading is "0.0x" the fuse is OK, if it reads "1" a new fuse is needed (Fig. 5.3-4).
- Replace a new fuse and put back the front panel, check if you hear the melody and the unit operates.

If the new fuse is blown out again you will need to prepare yourself for some further electrical work to investigate the causes, see next page.

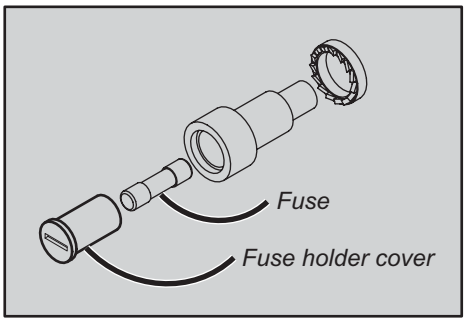

Fig. 5.1.3-2 Fuse holder and fuse (Fuse is rating for 125Vac, 2A).

Fig. 5.1.3-3 Set the ohmmeter to check the fuse.

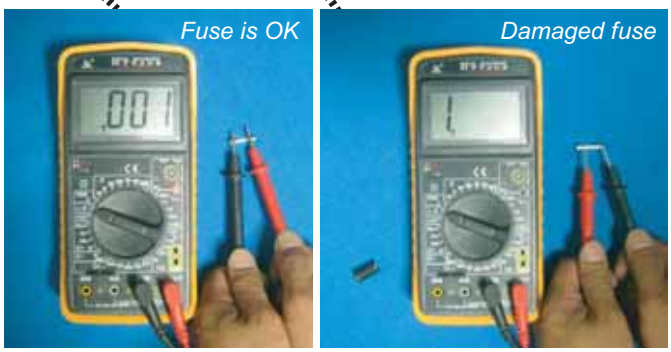

Fig. 5.1.3-4 If the reading is 00.0x, the fuse is OK, otherwise a new fuse is needed.

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After replacing the damaged fuse, the new fuses are still blown again as soon as the unit is plugged in.
As you replace the blown fuse with a new one and try to operate the unit, you find the new fuse is still blown out with unknown reasons. To fix this problem, you have to spend time to check all the electrical wires in the unit.
- Check if the power cord wire jackets are damaged. The damaged wires will cause a short circuit between them or the damaged Live line may touch the unit metal casing to cause a short circuit. You can use ohmmeter to check if the wires are short circuited.
- Check if the interlock switch is broken and there is a short circuit between the wires and parts around it.
- Check if the main circuit board connection wires are short circuited.
If you find any wire short circuit, you will need to change the wires.

After replacing the fuse, the unit is on with indicator lights on the display panel but when you try to operate the unit by pressing the buttons the fuse is blown out again.
To fix this problem, you can proceed with the following steps.
Check the main circuit board
- Open the bottom plate. **Remember to discharge the unit power contact terminals by creating a short circuit.**
- Unplug the connections of fan motor, UV lamp and high voltage power supply from the main circuit board and try to start the unit by pressing the POWER button. If the fuse is still blown out, you need to replace the main circuit board (Fig. 5.1.3-5). See **6.6 REPLACE THE MAIN CIRCUIT BOARD**. If the fuse is OK, you need to go ahead to check other connections to the main circuit board.

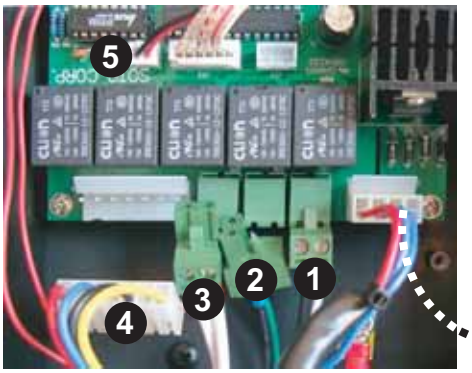

Fig. 5.1.3-5 Disconnect all the connections to the main circuit board except the power cord and negative ion connection. Start the unit by closing the interlock switches.
1-Power cord connection
2-High voltage power supply connection
3-UV lamp cord connection
4-Fan motor connection
5-Negative ion generator connection

Transformer connection

Check the power supply
-Connect the high voltage power supply connection (2#) to the main circuit board and start the unit by pressing the POWER button on the control panel (Fig. 5.1.3-6). If the fuse is blown out again you need to replace power supply. See **6.3 REPLACE THE POWER SUPPLY**. If the fuse is OK, go ahead to check the other connections.

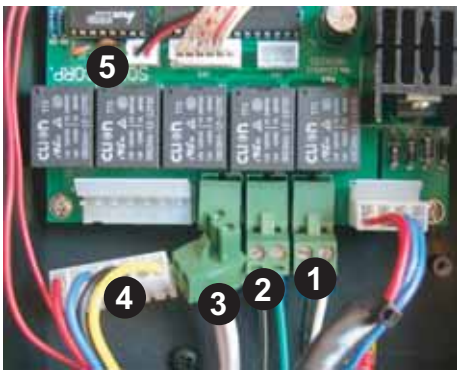

Fig. 5.1.3-6 Connect the power supply connection to the main circuit board, the UV lamp and fan motor connections are still unplugged. Try to operate the unit by closing the interlock switches with electrical tape.
1-Power cord connection
2-High voltage power supply connection
3-UV lamp cord connection
4-Fan motor connection
5-Negative ion generator connection

Check the UV lamp ballast
Connect the UV lamps terminal (3#) to the main circuit board and start the unit by pressing the POWER button on the control panel (Fig. 5.1.3-7). If the fuse is still blown out you need to replace the UV lamp holder (ballasts). See **6.2 REPLACE UV LAMP AND UV LAMP HOLDER**. If the fuse is OK, go ahead to check the fan motor connection.

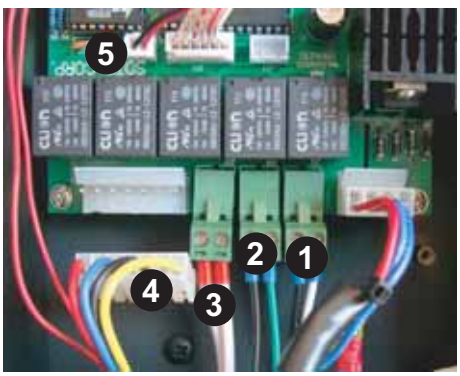

Fig. 5.1.3-7 Connect the UV lamps connection to the main circuit board and check the fuse. If the fuse is blown out the UV lamp ballast is damaged. You need to replace it.
1-Power cord connection
2-High voltage power supply connection
3-UV lamp cord connection
4-Fan motor connection
5-Negative ion generator connection

⚠ WARNING

While the unit is on, do not touch any electrical wires with hands, especially the main circuit board, power supply circuit board and the unit power contact terminals!

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Finally check the fan motor connection

Plug the fan motor (4#) connection to the main circuit board and start the unit by pressing the POWER button on the control panel. Press the SPEED button (Fig. 5.1.3-8). If the fuse is suddenly blown out, you will need to replace the motor capacitor. See **6.8 REPLACE THE FAN MOTOR CAPACITOR**. After replacing the motor capacitor, the fuse is still blown out, you have to replace the fan motor. See **6.7 REPLACE THE FAN MOTOR**.

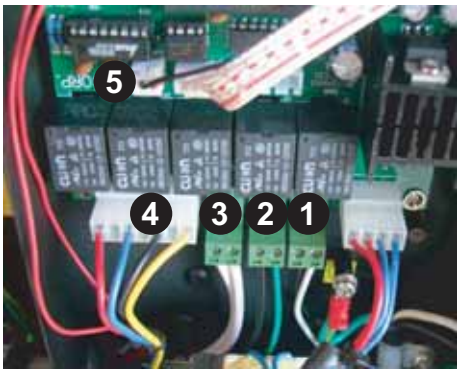
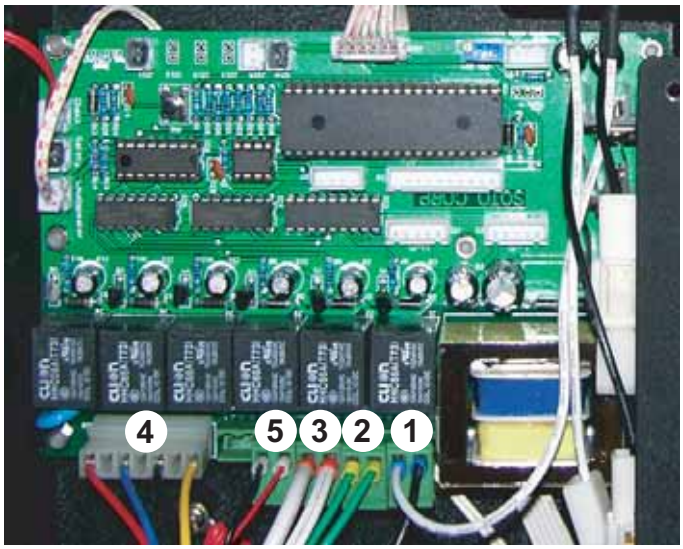


Fig. 5.1.3-8 Plug the fan motor connection to the main circuit board and check the fuse. If the fuse is still blown out, you will need to check the fan motor capacitor and fan motor.
1-Power cord connection
2-High voltage power supply connection
3-UV lamp cord connection
4-Fan motor connection
5-Negative ion generator connection



Main circuit board-A

An Important Notice:
For the units starting with ser.# **J200**xxx (Main circuit board-A), you can check all the connections in the similar way with the new main circuit board-B units.
For the main circuit board-A (Left picture):
1-Power cord connection
2-High voltage power supply connection
3-UV lamp cord connection
4-Fan motor connection
5-Negative ion generator connection

ENGLISH

5.2 CHECK INDICATOR LIGHT FLASHING

When the unit is turned on, the Check Unit indicator light flashes and you hear warning beep sound.

Most of time, this problem is due to damaged electronic cell, high voltage power supply failure or damaged discharge switch. However, there are other reasons. In order to make sure what causes this problem you will have to prepare yourself for some electrical work, have the necessary tools ready and proceed with the following steps.

Fig. 5.2-1 Required tools.
1-High voltage probe
2-Ohmmeter
3-Phillips screwdriver

The Troubleshooting Chart

To use this chart:
1. Follow the steps in order. Don't skip around.
2. Each time you isolate and fix a problem, go back to START.
3. Repeat all the steps until the air purifier checks out OK.

⚠ WARNING
Some of these steps expose dangerous high voltage. Only qualified service technician should attempt this procedure.

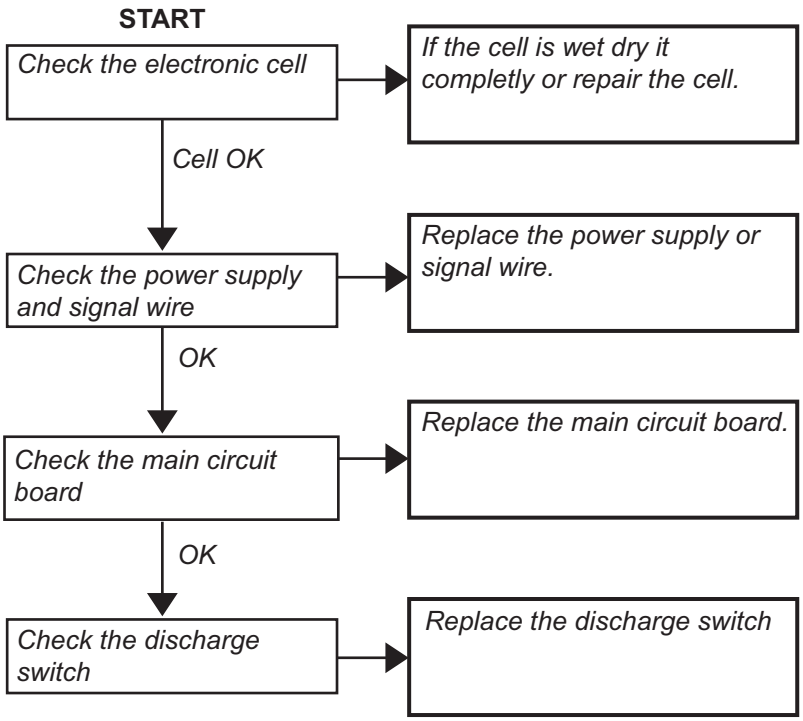


Fig. 5.2-2 Troubleshooting chart for CHECK INDICATOR LIGHT FLASHING.

ENGLISH

CHECK indicator light flashing

When you open the bottom plate you can see the twin red color wires (Power supply signal wire), which are connecting the power supply and the main circuit board (Fig. 5.2-3, No.4-signal wire). The microprocessor on the main circuit board is detecting the voltage on the signal wire when the unit is turned on.

As long as the voltage on the signal wire is less than 1.3V dc, the microprocessor understands the cell-power supply system is failed and light up the CHECK indicator light with warning beep sound. The following reasons can reduce the voltage on the signal wires to less than 1.3V DC, causing the CHECK indicator light flashing.

1. A short circuit in the cell

If there is a short circuit in the cell the power supply will automatically reduce the voltage less than 1.3V dc.

2. Power supply failure

If the power supply cannot provide high and low voltages to the cell, the voltage will be less than 1.3V dc on the signal wire. If the signal wire itself is damaged, the voltage will also be blow 1.3V dc.

3. Discharge switch short circuit

If the discharge switch is short circuited itself between the low voltage wire and the ground wire, the voltage will be decreased under 1.3V dc.

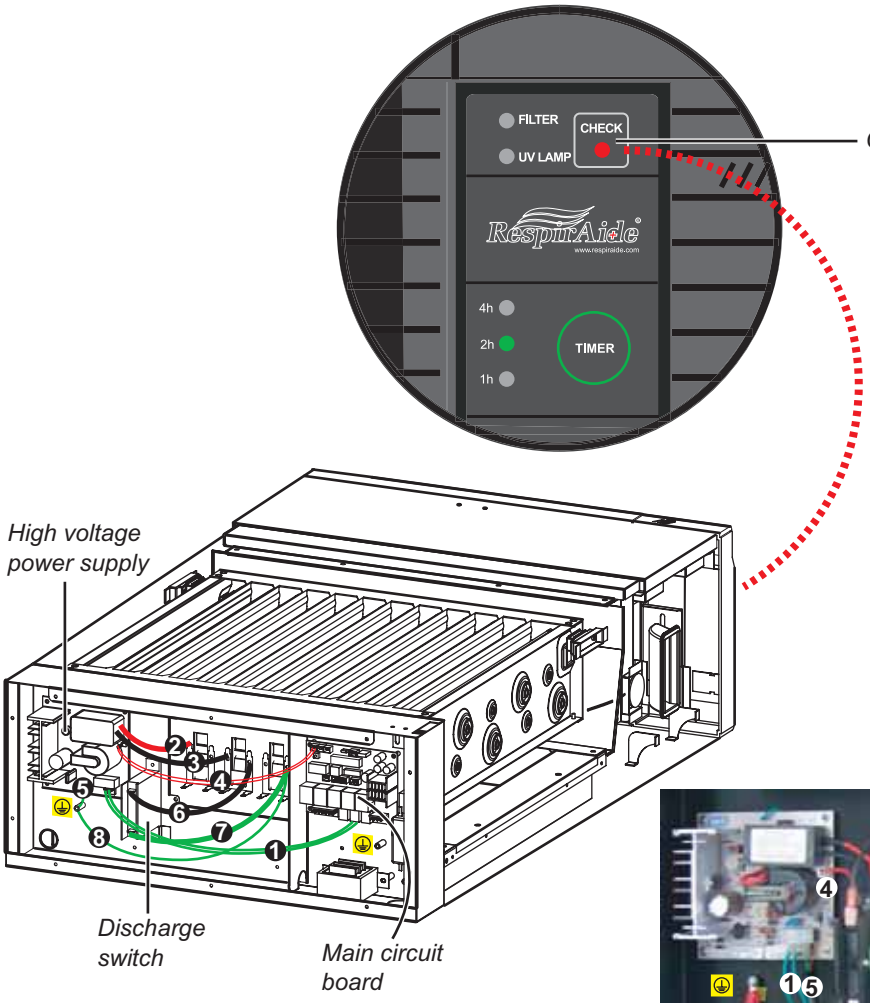
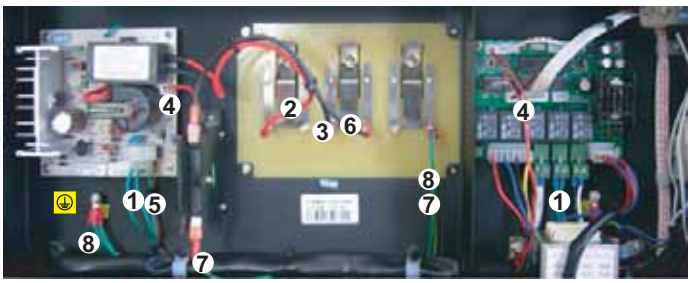
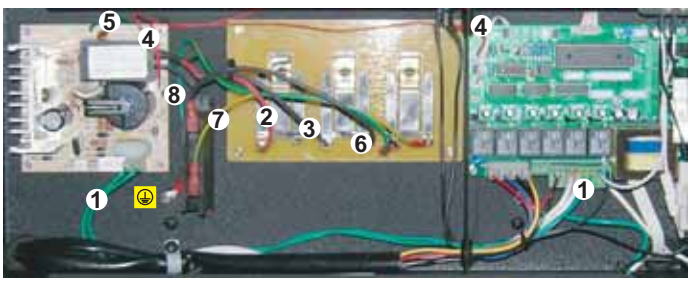


Fig. 5.2-3 The CHECK indicator light flashes when the voltage on the power supply signal wire is less than 1.3V dc.
1-Power supply power cord
2-High voltage wire of power supply
3-Low voltage wire of power supply
4-Power supply signal wire
5-Ground wire of power supply
6-Voltage wire of discharge switch
7-Ground wire of discharge switch
8-Ground wire of unit ground terminal

Main circuit board-B



Main circuit board-A



ENGLISH

5.2.1 Check the electronic cell

Check if the cell is wet

It is extremely important to dry the cell thoroughly before starting the unit. If the cell is wet, there will be a short circuit in the cell through the wet ceramic insulators, causing the CHECK indicator light flashing (See page 5-7). Further more, if the cell has been not completely dried before using for many times the ceramic insulators will be cracked down (Fig. 5.2.1-1~2).

WARNING

To reduce risk of electric shock always stop the operation and unplug the power cord from the electrical outlet before maintenance.

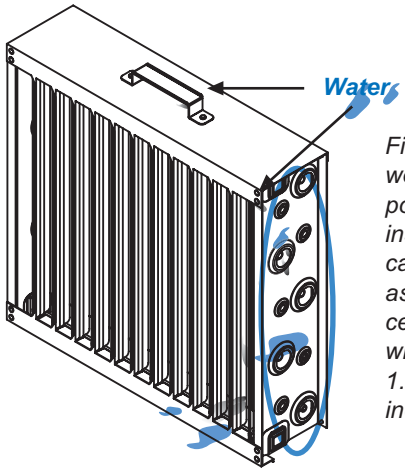


Fig. 5.2.1-1 When the cell is wet, the ionizing wires and positive plates cannot be insulated from the ground, causing a short circuit. As long as a short circuit occurs in the cell the voltage on the signal wire will be decreased less than 1.3V dc, leading to the CHECK indicator light flashing.

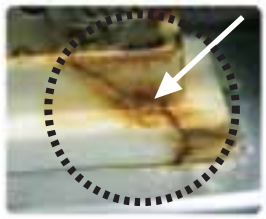


Fig. 5.2.1-2 The square ceramic insulator was burnt and cracked down because of a long time use of the wet cell.

Check if the CHECK indicator light still flashes when you remove the cell from the unit.

If the cell is not wet, try to operate the unit after removing the cell (Fig. 5.2.1-3).

- Stop the operation and unplug the power cord.
- Open the front panel and take out the cell.
- Close the front panel and start the unit and check if the CHECK indicator light is still flashing. If it does not flash again, you need to fix the cell. If the CHECK indicator light still flashes, you will have to go ahead to investigate other causes.

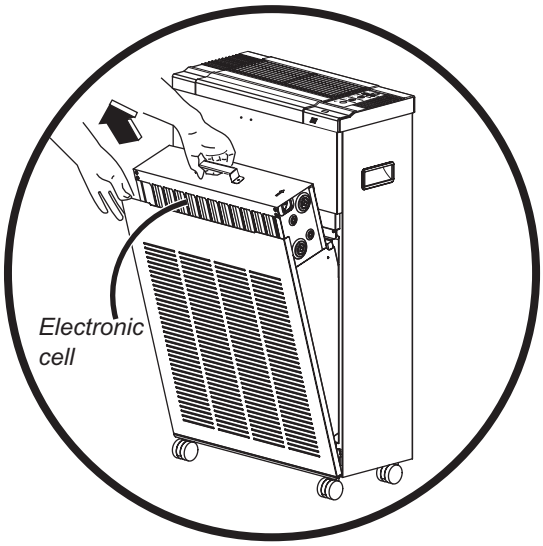


Fig. 5.2.1-3 Press the POWER button to stop the operation and unplug the power cord. Open the front panel, pull out the cell before operating. If the CHECK indicator light does not flash, it means the cell is damaged.

Visually check the cell

Lift the cell in front of a bright light and look through, visually inspect if there are broken or bent ionizer wires or if the collector plates are bent or deformed. Broken or bent ionizer wires and bent collector plates can cause a short to ground, often resulting in visible arcing or sparking. Any short in the ionizer or collector section lights the CHECK indicator light. The cell should not be used until the pieces of broken wire are removed or replaced. The cell can be used temporarily with one wire missing, although the wire should be replaced as soon as possible (Fig. 5.2.1-4).

A bent collector plate

A wire on the collector plates

A metal plate on the collector plates

Fig. 5.2.1-4 The collector plate is bent, there is a metal wire and a metal plate on the collector plates, causing the CHECK indicator light flashing.

ENGLISH

Use an ohmmeter to check the electronic cell for short circuits

On the bottom plate of the cell, there are 3 different power contact terminals.

1-Ionizer terminal: Connecting to ionizer wire latch, providing high voltage of the power supply (See **2.2 ELECTRONIC CELL**).

2-Collector terminal: Connecting to the positive collector plates, providing low voltage of the power supply.

3-Ground terminal: Connecting to the cell frame and all of the grounded collector plates.

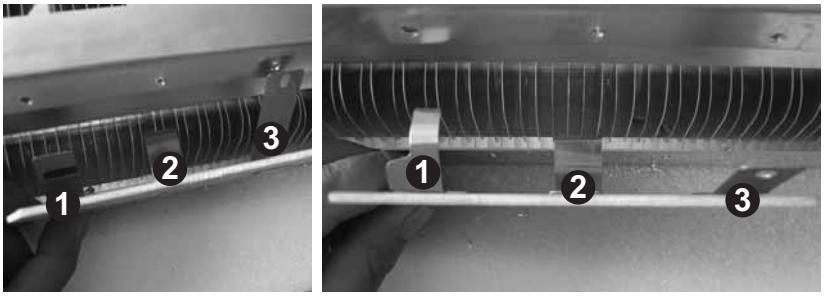


Fig. 5.2.1-5 Different cell power contact terminals
1-Ionizer terminal
2-Collector terminal
3-Ground terminal
The ionizer wires and positive collector plates are insulated from the cell frame (Ground) each by the square and round shape ceramic insulators. Damaged ceramic insulators can cause a short to ground, lighting up CHECK indicator light on the display panel.

How to check the cell with ohmmeter

- Set the ohmmeter in the ohm range of 200M (Fig. 5.2.1-6).
- Place the black on the cell frame (Ground) and red each on the ionizer terminal, collector terminal and ground terminal. It will read 1 or 0.0x. (Fig. 5.2.1-7). See **6.12 REPLACE THE CERAMIC INSULATORS**.

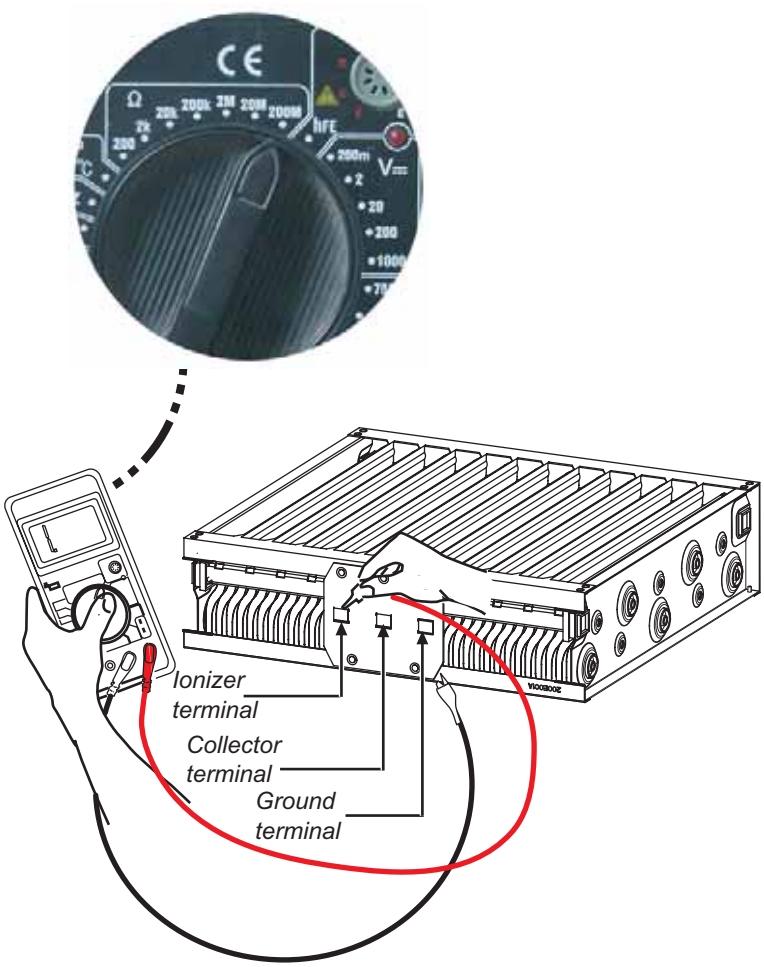
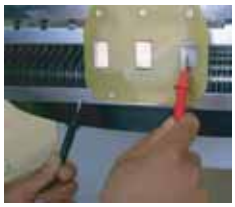


Fig. 5.2.1-6 How to check the cell with ohmmeter for short circuit.

Check the ionizer terminal to ground, it should show 1 (infinite). If it reads 0.0x, the ionizer wires are short circuited and need to be repaired.

Check the collector terminal to ground, it should show 1 (infinite). If it reads 0.0x, the positive collector plates are short circuited and need repair.



Check the ground terminal, it should show 0.0x, indicating the cell frame is well grounded.

Fig. 5.2.1-7 Check the cell with ohmmeter for short circuit.

ENGLISH

5.2.2 Check the power supply and the main circuit board
If the CHECK indicator light still flashes after you remove the cell , go ahead to check the high voltage power supply.

Check the high voltage output of the power supply
- Have your high voltage probe ready. Red to red voltage ohmmeter input and black to black. The high voltage probe shown is 1000:1, meaning 1000 volt at the probe should be 1 volt dc at ohmmeter.
- Set the ohmmeter in voltage DC range of 20V (Fig. 5.2.2-1).
- Open the bottom plate and make sure the power supply connections are connected tightly (Fig.5.2.2-2).

Caution: Do not touch the unit power contact terminals without discharging the power contact terminals!
- Place the black of the ohmmeter on the unit ground terminal and red one on high voltage or low voltage terminal (Fig. 5.2.2-3).
- Check the output of the power supply. The high voltage should read 7.3~7.8KV and the low voltage will be 3.5~4.5 KV when there is a cell in the unit. If it reads less than 6.0 KV or no voltage, you will have to further investigate other reasons.

Fig. 5.2.2-1 Prepare the high voltage probe and ohmmeter. Set the ohmmeter in 20V dc voltage range.

Fig. 5.2.2-2 Lay down the unit horizontally on the soft mat. Unscrew the 10 screws located on the bottom of the unit with Phillips screwdriver.

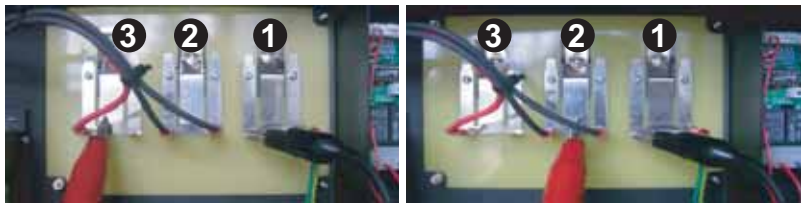


Fig. 5.2.2-3 Check the high and voltage output of the power supply. Place the ground clip of the high voltage probe on the unit ground terminal and connect the probe each to high voltage and low voltage terminal.
1-Ground terminal
2-Low voltage terminal
3-High voltage terminal

Check the main circuit board
If there is no voltage on the high or low voltage terminal, go ahead to check the main circuit board voltage output to the power supply.
- Set the ohmmeter in the range of 200V ac.
- Make sure the front panel is closed correctly.
- Check the output voltage from the main circuit board to input of the power supply. It should read somewhere close to 120V ac. If the reading is no voltage, you have to change the main circuit board. See **6.6 REPLACE THE MAIN CIRCUIT BOARD**. If the output voltage of the main circuit board is close to 120V ac and connections 2# and 3# are fastened tightly, you have to change the power supply with a new one (Fig.5.2.2-4). See **6.3 REPLACE THE POWER SUPPLY**.

Fig. 5.2.2-4 After fastening the connections, check the voltage output of the main circuit board to the power supply. It should read close to 120V ac. If not, replace the high voltage power supply.
1-Power supply connection
2-Power supply cord connection
3-Power supply signal wire connection

ENGLISH

5.2.3 Check the voltage on the power supply signal wire

If the high voltage or low voltage of the power supply is OK, but the CHECK light still flashes, you should check the voltage on the power supply signal wire with ohmmeter (Fig. 5.2.3-1). It should read close to 1.3V dc, if not, try to replace the wire and check again. If the reading still shows less than 1.3V dc or zero, the C10 resistance is damaged, you will need to replace the high voltage supply (See **3.3 HIGH VOLTAGE POWER SUPPLY AND UNIT POWER CONTACT BOARD**).

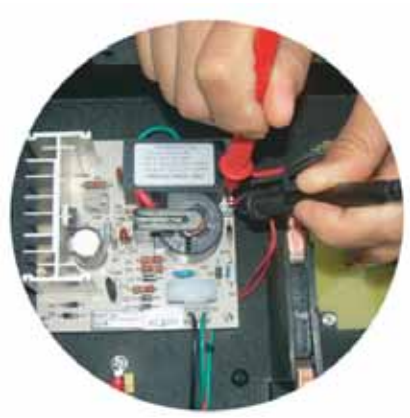


Fig. 5.2.3-1 Check the voltage on the power supply signal wire. It should read close to 1.3V dc.

5.2.4 Check the discharge switch

If the CHECK light still flashes, you also need to check the discharge switch.
- Unplug the discharge switch low voltage wire connection from the unit low voltage contact terminal (Fig. 5.2.4-1).
- Try to start the unit. If the CHECK light does not flash, the discharge switch is damaged, you will have to replace or repair it. See **6.5 REPLACE THE DISCHARGE SWITCH**.

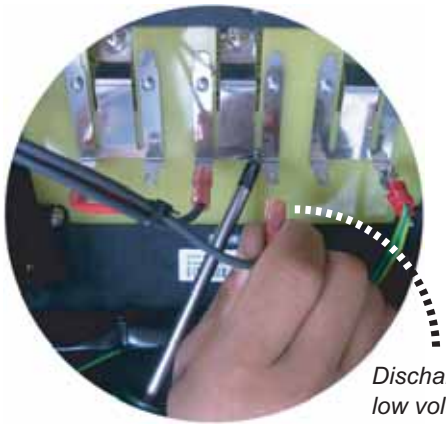


Fig. 5.2.4-1 Unplug the discharge switch low voltage black wire connection and to operate the unit. If the CHECK indicator light stops to flash, replace the discharge switch. When the switch voltage wire is disconnected, the switch does not work.

Discharge switch low voltage wire connection

ENGLISH

5.3 NO FAN AND INCORRECT AIR FLOW

When the unit is turned on, the fan doesn't blow properly. When the speed is switched, the fan has incorrect speed rates.

Most of time, this problem is due to damaged motor capacitor, electric motor, or motor wire connection loose or main circuit board failure. However, there are other reasons. In order to make sure what causes this problem you will have to prepare yourself for some electrical work, have the necessary tools ready and proceed with the following steps.

Fig. 5.3-1 Required tools.
1-Ohmmeter
2-Phillips screwdriver

The Troubleshooting Chart

To use this chart:
1. Follow the steps in order. Don't skip around.
2. Each time you isolate and fix a problem, go back to START.
3. Repeat All the steps until the air purifier checks out OK.

⚠ WARNING
Some of these steps expose dangerous high voltage. Only qualified service technician should attempt this procedure.

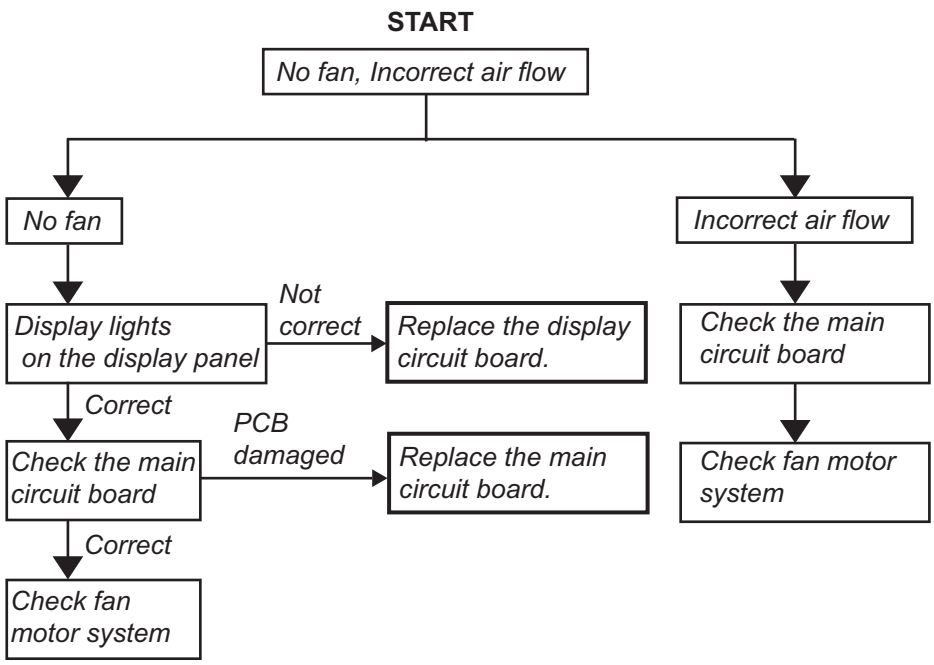


Fig. 5.3-2 Troubleshooting chart for NO FAN.

ENGLISH

5.3.1 NO FAN

No fan, incorrect display lights and the buttons do not work properly

When the unit is powered on, the display lights show incorrect and some buttons do not work properly.

To fix this problem, you will need to proceed with the following steps.
- Open the bottom plate and fasten the display circuit board wire connection (Fig. 5.3.1-1). If the unit still has problem, you will need to disassembly the top plastic cover and fasten the connection to the display circuit board (See **6.7 REPLACE THE FAN MOTOR**).
- If you are sure the connections are tightly connected, you have to replace the display circuit board (See **6.9 REPLACE THE DISPLAY CIRCUIT BOARD, ODOR SENSOR, REMOTE RECEIVER**).

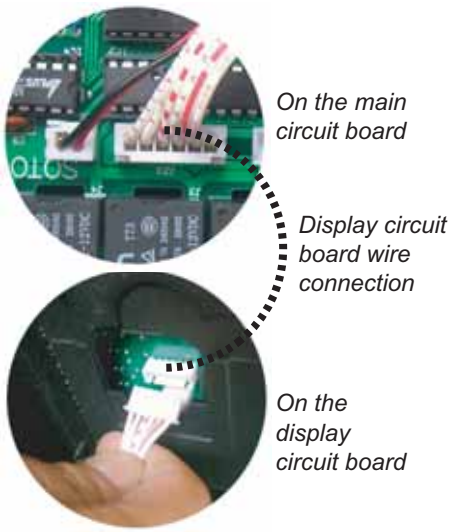


Fig. 5.3.1-1 Display circuit board wire connections to the main circuit board and display circuit board.

No fan, but correct display and the SPEED button does not work correctly

When the unit is powered on, all the display lights show correct and the buttons except the SPEED work properly, go to check the main circuit board.
- Open the bottom plate.
- Inspect if the fan motor cable connection is tightly connected to the main circuit board. If the cable connection is loosened, fix it and try to press the SPEED button again. If the button still does not work properly, go ahead to check the output voltage of the main circuit board to the fan motor.
- Set the ohmmeter at the range of 200V ac (Fig.5.3.1-2).
- With the ohmmeter, check three speed output voltages (Fig. 5.3.1-3). First, on the low speed, place the terminals on yellow (com) and black (L) wires, it should read somewhere close to 120V ac. Next, on medium speed, the white and blue (M) wires should read somewhat close to 120V ac. Finally, on the high speed, place the ohmmeter terminals on white and red (H), it should read close to 120V ac (Fig.5.3.1-2).

If you are not sure the fan motor wire connection is correct, you can unplug the connection and check the voltage output on the pins. If the voltages are not 120V ac, you will have to replace main circuit board (Fig 5.3.1-3). See **6.6 REPLACE THE MAIN CIRCUIT BOARD**. If all the output voltages are close to 120V ac, you will need to check the motor capacitor.

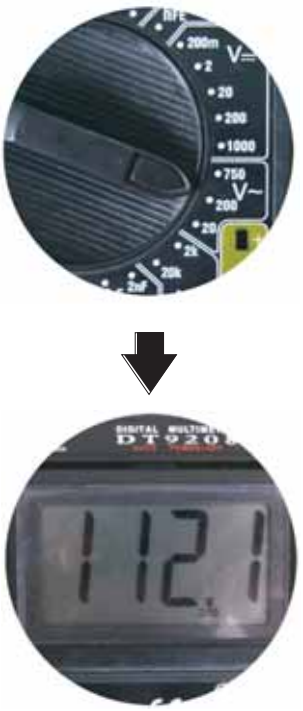
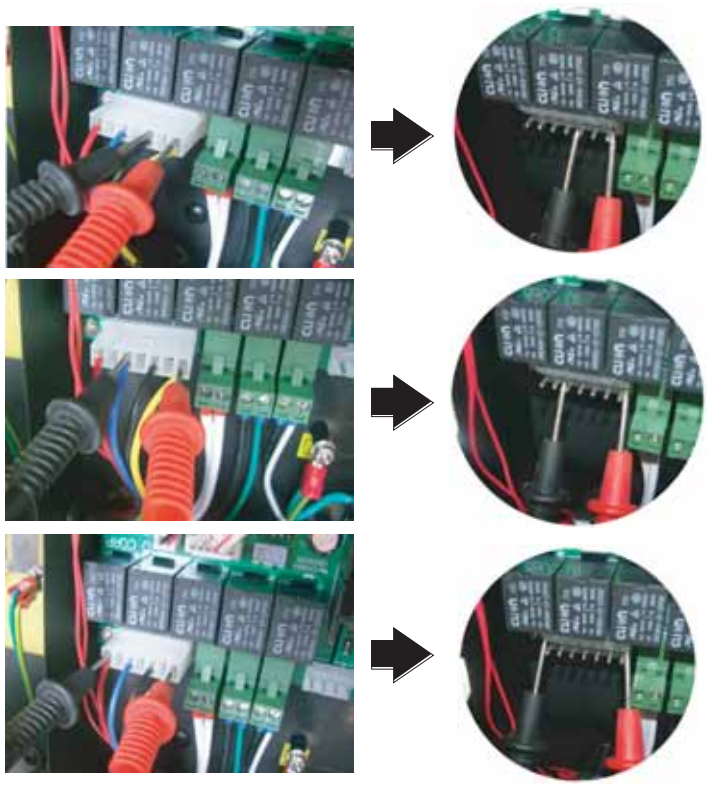


Fig. 5.3.1-2 Set the ohmmeter at the range of 200V ac.



Place the ohmmeter terminals on the common and the L speed (Black). It should read close to 120V ac.
Do not touch the pins with hands when you check the pins of the connection!

Place the ohmmeter terminals on the common and the M speed (Blue). It should read close to 120V ac.

Place the ohmmeter terminals on the common and the H speed (Red). It should read close to 120V ac.

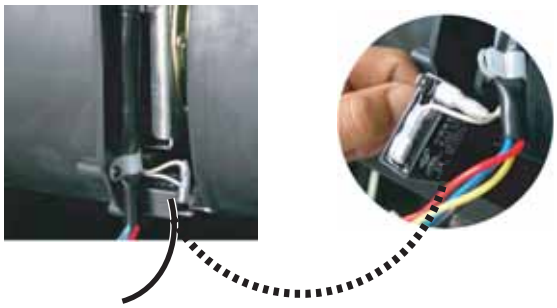
Fig. 5.3.1-3 Check the voltage output to the fan motor on the main circuit board.

Check the motor capacitor and fan motor

If the motor cable output voltages of the main circuit board are correct, you have to go ahead to check the fan motor capacitor or fan motor (Fig. 5.3.1-4).

- Remove the unit upper cover and fan motor front cover to find the motor capacitor (See **6.8 REPLACE THE FAN MOTOR CAPACITOR**).
- If the motor still does not run correctly after replacing the motor capacitor, you will go ahead to replace the fan motor. (See **6.7 REPLACE THE FAN MOTOR**).

Hint: When the capacitor is damaged you can hear a buzz sound from the fan motor, however if the fan motor is broken there is no any sound.



Motor capacitor

Fig. 5.3.1-4 Fan motor capacitor (6uf, 250V).

5.3.2 INCORRECT AIR FLOW

The fan motor has three speeds air flow, however the air flow is incorrect, you will need to check the main circuit board, fan motor and the power source.

Check the main circuit board

- Open the bottom plate.
- Set the ohmmeter at the range of 200V ac (Fig. 5.3.2-1). Check the Low, Medium and High speed output voltage on the main circuit board. They should read close to 120V ac. If not, you need to replace the main circuit board.

An important notice:

When you check the output voltages of the main circuit board to the fan motor, the fan motor speed must be set at the checking speed (Fig. 5.3.2-2).

Fig. 5.3.2-1 Set the ohmmeter in the range of 200V ac.

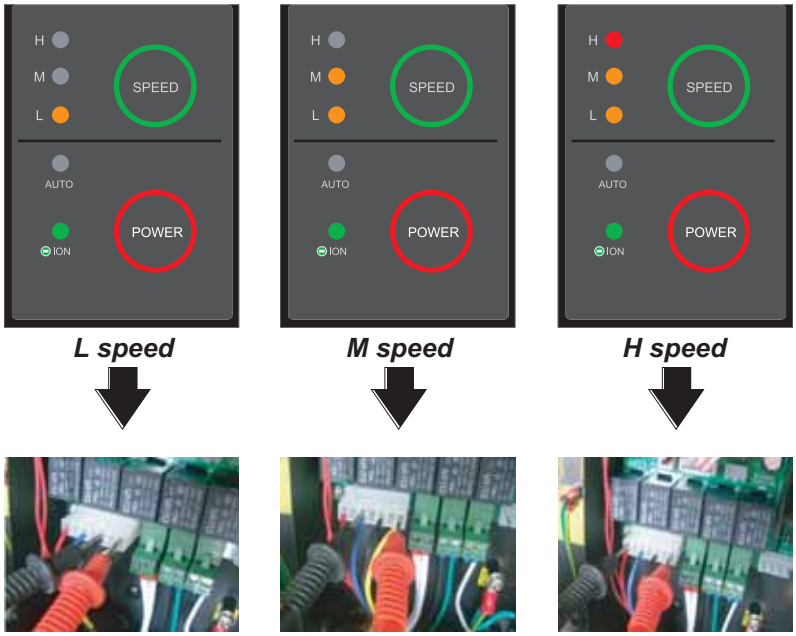


Fig. 5.3.2-2 Check the voltage output of the main circuit board to the fan motor. The SPEED is set at the checking speed.

Check the fan motor

- Remove the unit upper cover and the fan motor front cover (See **6.7 REPLACE THE FAN MOTOR**).
- Check if the motor wire connection is loosened or connected correctly or there are any wrong connections of the wires.

Check the power source

Sometimes, the power source is not correct. You can check it with ohmmeter, it should be close to 120V ac. If not, do not operate the unit.

ENGLISH

5.4 NO UV LIGHT

When the unit is turned on, the UV light does not light up.

Most of time, this problem is because of a loose UV bulb which could be due to shipping and handling. However, there are other reasons. In order to make sure what causes this problem you will have to prepare yourself for some electrical work, have the necessary tools ready and proceed with the following steps.

Fig. 5.4-1 Required tools.
1-Ohmmeter
2-Phillips screwdriver

The Troubleshooting Chart

To use this chart:
1. Follow the steps in order. Don't skip around.
2. Each time you isolate and fix a problem, go back to START.
3. Repeat All the steps until the air purifier checks out OK.

⚠ WARNING
Some of these steps expose dangerous high voltage. Only qualified service technician should attempt this procedure.

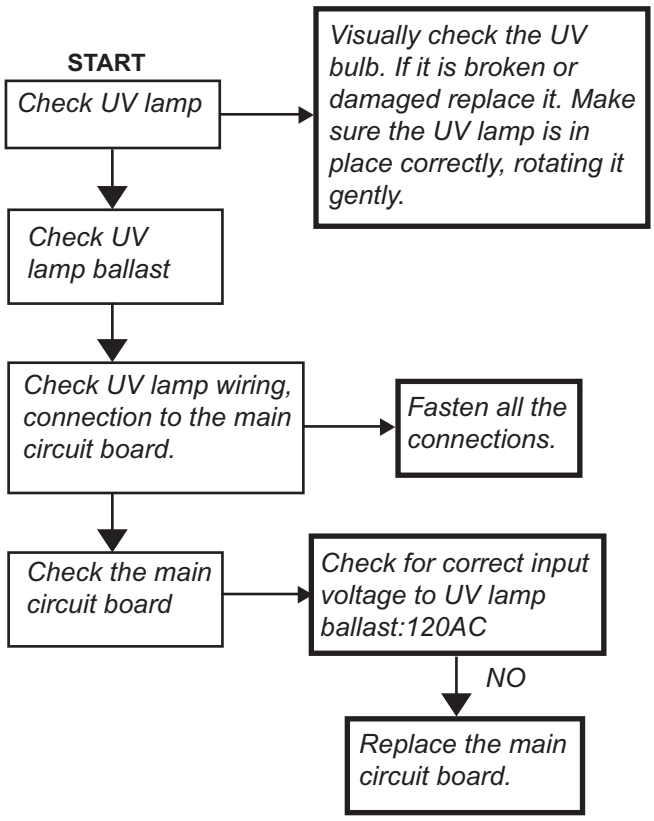


Fig. 5.4-2 Troubleshooting chart for NO UV LIGHT.

ENGLISH

5.4.1 Check the UV lamp

- Stop the operation and unplug the power cord from the electrical outlet.
- Take off the front panel.
- After removing the UV light blocker, visually check the UV lamp. If the UV lamps are broken or damaged, replace the lamp (See **6.2 REPLACE UV LAMP AND UV LAMP HOLDER**).
- If the UV lamp seems good, rotate the lamp gently to reinstall the lamp correctly at the ballast (Fig.5.4.1-1). After the UV lamp is placed correctly at the ballast or you have replaced the lamp and there is still a problem with UV light, you need to check the UV socket power.

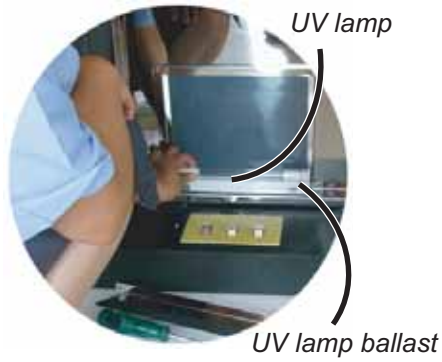


Fig. 5.4.1-1 UV lamp and UV lamp ballast.

5.4.2 Check UV lamp ballast

- Set the ohmmeter at the Volt ac range of 200V ac (Fig. 5.4.2-1).
- Place the red and black lead into the UV lamp socket.
- Push the interlock switch with plastic handled screw driver, ignoring the beep sound from the display panel. With your hand solid on the UV lamp cord insulators, check the UV power cord. It should read close to 120V ac. If the cord is OK and there is power, you will need to change the ballast. If there is no power on the cord, you have to go ahead to check the main circuit board.

5.4.3 Check the main circuit board

- Open the bottom plate.
- Set the ohmmeter at the Volt ac range of 200V ac.
- Check the output voltage for UV lamp ballast at the main circuit board, it should read somewhere close to 120V ac. If the voltage is OK, you will need to change the UV lamp cord wire (White colour). If the voltage is incorrect at the main circuit board connection, you will have to replace the main circuit board.

Make sure the UV lamp cord connection is tight before checking the output power (Fig.5.4.3-1).

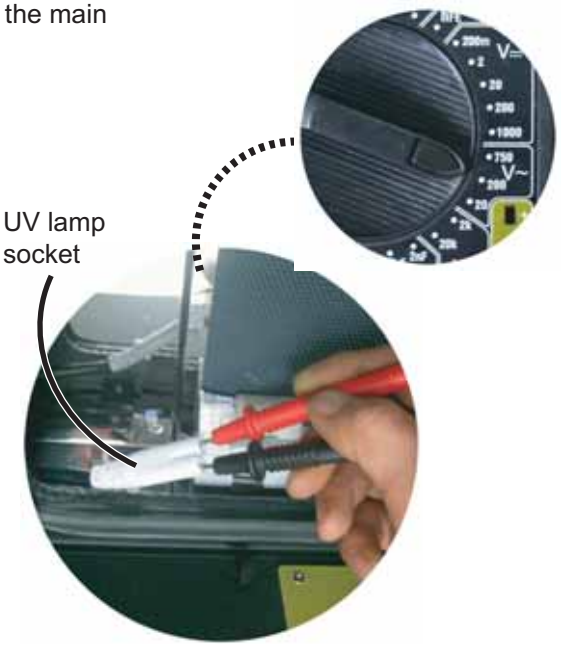


Fig. 5.4.2-1 Set the ohmmeter in the range of 200V ac and check the UV lamp socket power.

Fig. 5.4.3-1 Check the output voltage for UV light ballast on the main circuit board connection.

ENGLISH

5.5 THE BUTTONS DO NOT WORK

When the unit is plugged in, there is a melody but the buttons do not work, or the unit turns on but the buttons freeze and a click sound is heard. It sounds like sparking. One or more buttons do not work properly.

Required tools.
1-Needle-nose pliers
2-Phillips screwdriver

Most of time, this problem is due to sparking from the cell and unit power contact board. Any spark can interfere with the display circuit board wire to cause the incorrect display lights or freeze the buttons.

5.5.1 Check the electronic cell and unit power contact board

Inspect the cell for bent collector plates, broken ionizer wires, dirt on insulators or damaged or dirty contact terminals. Any sparking from the cell will interfere with the display circuit board wire and cause the incorrect display indicator lights or freeze the buttons.
If the cell is not placed correctly, a sparking occurs between the cell and the unit power contact terminals. Take out the cell and put it back correctly (Fig.5.5.1-1).

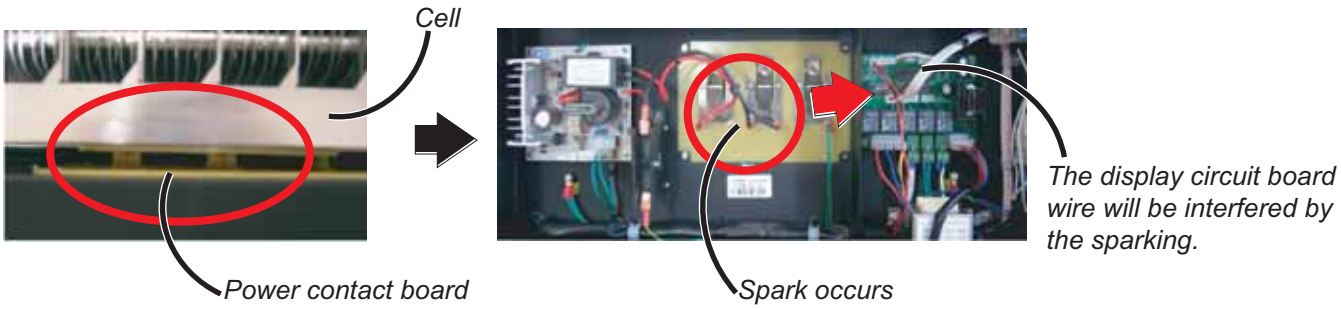


Fig. 5.5.1-1 If the cell is not placed correctly so there is a space between cell and unit epoxy resin power contact terminal. This will cause a spark to interfere with the display circuit board wire, causing a button freeze.

If the cell still cannot contact the unit power contact terminal after you replace the cell, you will need to increase the height of the unit power contact terminal with needle-nose pliers (Fig. 5.5.1-2).

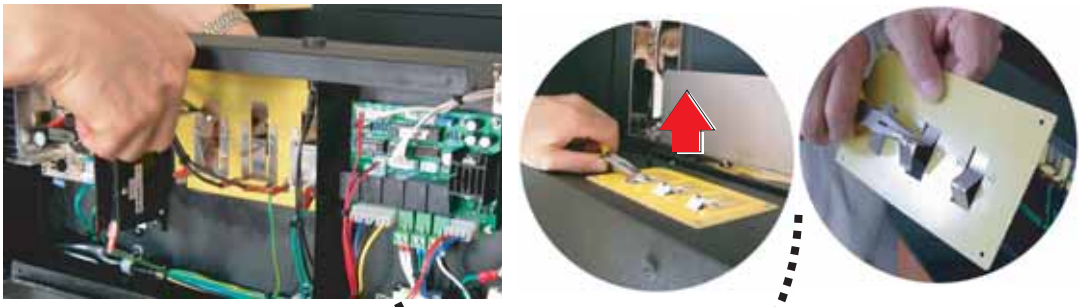


Fig. 5.5.1-2 Adjust the power contact terminals so that the cell can contact the unit power contact terminals closely.

5.5.2 Check the discharge switch

Some times, a spark may occur around the discharge switch voltage wire or between the unit power contact board screw and the high voltage terminal (Fig.5.5.2-1). To fix this problem, you can paste plastic tape beneath the high voltage terminal. For more information, see **5.8 SPARK BETWEEN HIGH VOLTAGE TERMINAL AND SCREW** and **5.9 DISCHARGE SWITCH SPARK**.

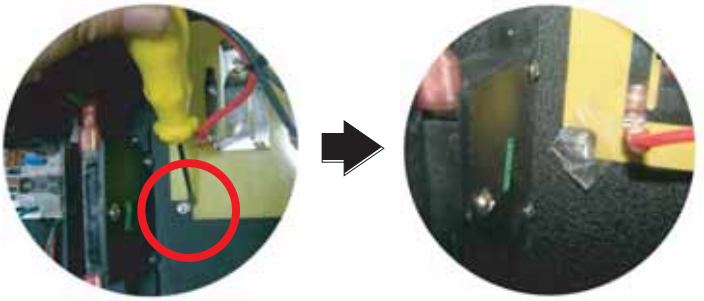


Fig. 5.5.2-1 Some times, especially when the air is moist a spark may occur around the discharge switch or the high voltage contact terminal.

ENGLISH

5.6 MELODY (CHIMES) FAILURE

When the unit is plugged in, there is no melody, but the unit works properly.
Most of time, this problem is due to sparks from the unit, damaged speaker, loose wires, or the blown melody chip (IC6 for PCB-A and IC4 for PCB-B, see Fig. 5.6-1).

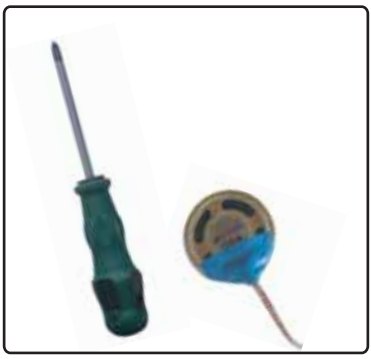


Fig. 5.1 Required tools.
1-Phillips screwdriver
2- Speaker

To solve this problem, you can proceed with the following steps.

Check sparks

Check for any sparks from the cell, power contact terminals, and between cell and unit contact terminals, between metal pre filter and unit front panel. If there is no spark, go ahead to investigate other reasons.

Check the main circuit board

- Open the bottom plate.
- Check if the speaker wire connection is tightly connected and make sure the IC6 or IC4 melody chip on the main circuit board is inserted correctly.
- Unplug the problem speaker wire connection from the main circuit board, and connect a new speaker to the main circuit board (Fig. 5.6-2).
- If the new test speaker works well, you will need to replace the speaker with a new one. See **6.13 REPLACE THE SPEAKER**. Some times, the wire is detached from the speaker to cause no melody.
- If the speaker still does not work, you will need to replace the melody chip or the main circuit board (See **6.6 REPLACE THE MAIN CIRCUIT BOARD**).

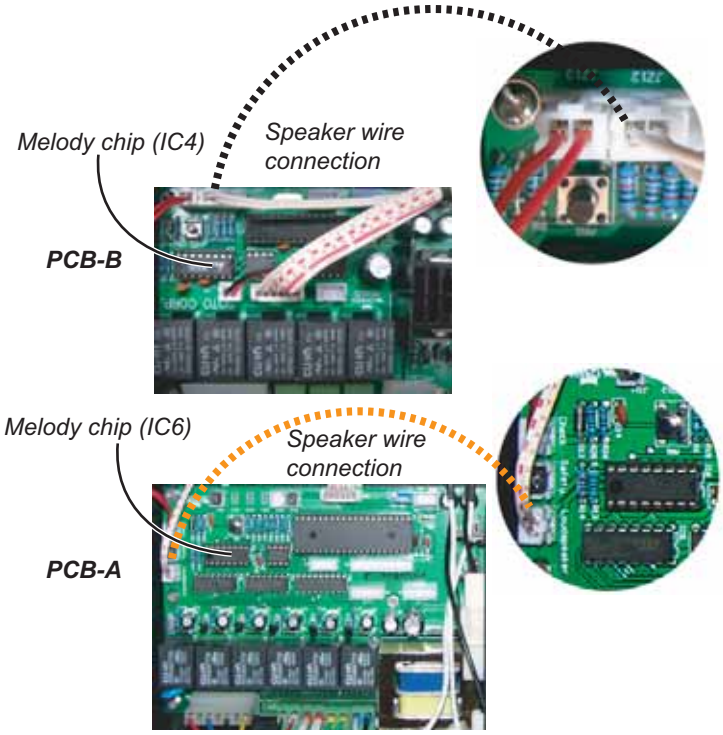


Fig. 5.6-1 The speaker wire connections.

Fig. 5.6-2 Check the main circuit board with a new speaker.

ENGLISH

5.7 FILTER AND UV LAMP RESET PROBLEM

When the Filter Life or UV Lamps indicator light flash they tell the time for UV activated carbon filter or UV lamps to be replaced. After replacing the filter or UV lamps, the unit cannot be reset.
**** In the old model, there is no UV lamp replacing indicator lights on the display panel.**

In fact, this problem seldom occurs. If this problem happens, it is due to the remote control failure or some other reasons. In order to make sure what causes this problem you will need to some electrical work, and proceed with the following steps.

Fig. 5.7-1 Required tools.
1-Remote control
2-Phillips screwdriver

The Troubleshooting Chart

To use this chart:
1. Follow the steps in order. Don't skip around.
2. Each time you isolate and fix a problem, go back to START.
3. Repeat All the steps until the air purifier checks out OK.

⚠ WARNING
Some of these steps expose dangerous high voltage. Only qualified service technician should attempt this procedure.

Notice:
After the Filter Life or UV Lamps indicator light flashes the unit will have another 50 hours of operation remaining before reset the unit to help customers have enough time to replace the filter or UV lamps. If you do not reset the unit during this time, the unit will automatically shut off and all the buttons or remote control will not work again.

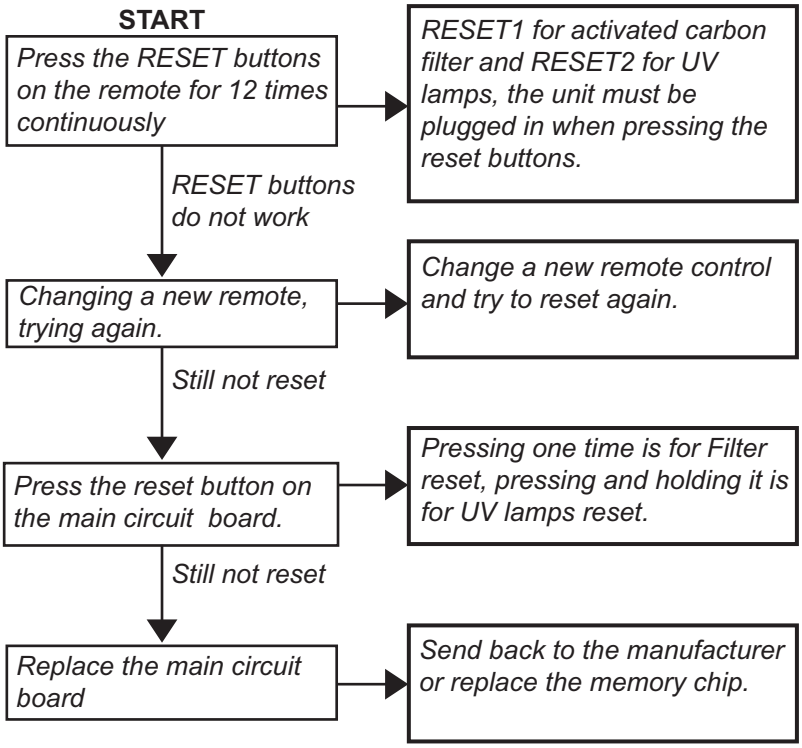


Fig. 5.7-2 Troubleshooting chart for RESET PROBLEM.

ENGLISH

5.7.1 FILTER and UV LAMP indicator light flashing

When the activated carbon filter or UV lamp needs to be replaced, the FILTER or UV LAMP indicator light on the control panel will flash red. The unit will automatically shut off after the FILTER or UV LAMP indicator light flashes for 50 hours. If you do not reset them, the unit does not work (Fig. 5.7.1-1).

- Plug in the power cord.
- All the display indicator lights will flash for 2 seconds with a starting melody.
- After the melody stops, the CHECK indicator light will turn green from red.
- When pressing the POWER button, the FILTER or UV LAMP indicator light will flash red for 8 times with a beeping, the unit does not work, you need to reset the FILTER or UV LAMP after replacement of activated carbon filter or UV lamp.

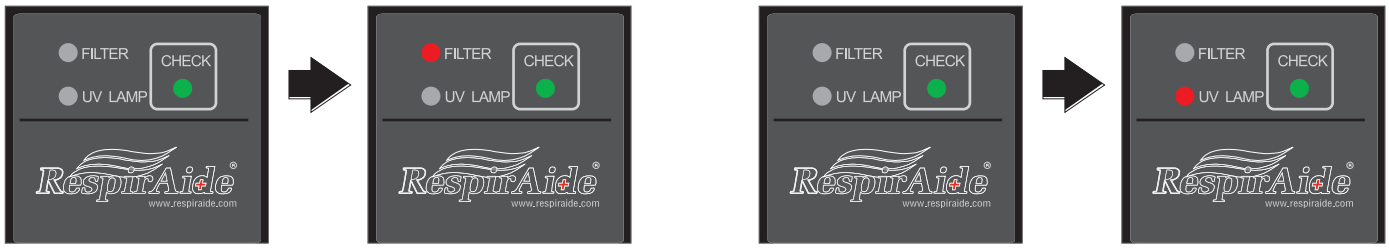


Fig. 5.7.1-1 When you press the POWER button on the control panel or on the remote control the FILTER or UV LAMP indicator light will flash red for 8 times with a beeping sound but the unit does not operate. You need to reset the unit after replacing the activated carbon filter or UV lamp.

5.7.2 How to reset the FILTER or UV LAMP indicator light

There are two ways to reset the replacement lights.

Reset with remote control

- Connect the power plug into the wall outlet.
- Press the POWER button on the remote control. If the FILTER or UV LAMP indicator light flashes red, it tells the remote control and the remote receiver of the unit are OK, otherwise you will need to check the remote control or remote receiver on the display circuit board.
- After replacing the activated carbon filter or UV lamp, press the RESET1 button (For activated carbon filter) or RESET2 button (For UV lamp) for 12 times continuously. If the unit is reset you can hear a beeping sound and the unit will work. If the unit still cannot be reset with the remote control, you will need to change another remote control to reset the unit (Fig. 5.7.2-1).

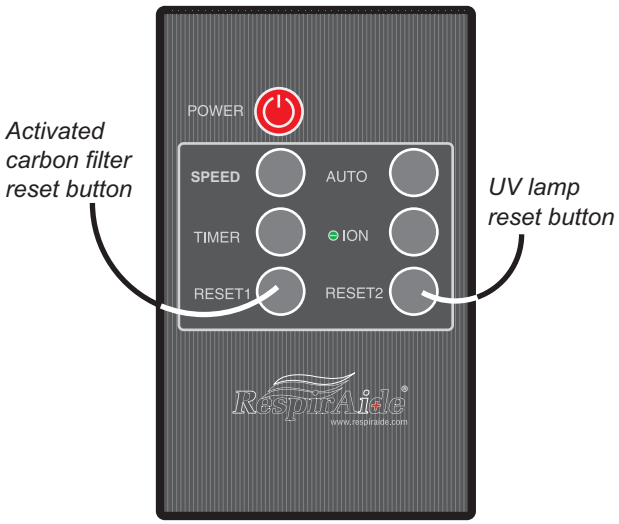


Fig. 5.7.2-1 Press the RESET buttons for 12 times continuously to reset the replacement indicator lights.

Note:

When the button contact circuit on the remote control circuit board is touched by the silver coat inside the sticker, the remote control sends out signals. If you press the button once and release, the remote control sends out a signal and the circuit board will carry out the desired function. However, if you do not release the button after pressing or the button sticker always contact the button contact circuit, the remote control can not send out another signal and the remote does not work. For instance, when you try to reset the unit, if the size of the sticker coat is too big and always cover the button circuit, even if you press the button several times, the remote control just sends out a signal, leading to the reset failure. The reason is the microprocessor needs 12 times signals from the remote control. To solve this problem, you will need to change the sticker or past small insulator tape around the button coat to decrease the size of the coat. For more information, see ***3.8 REMOTE CONTROL.***

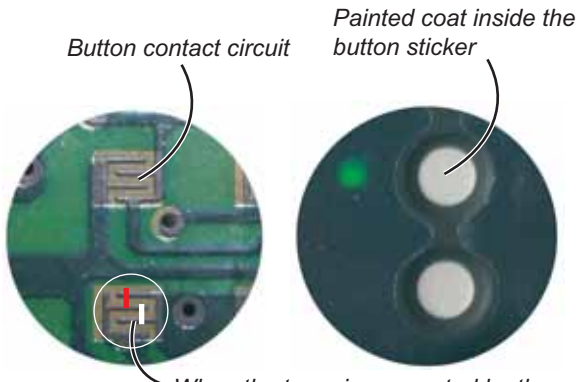


Fig. 5.7.2-2 The button contact circuit and remote control sticker.

ENGLISH

Reset with the reset button on the main circuit board

If you cannot reset the FILTER or UV LAMP indicator light with the remote control, or have no remote control on your hand, you can reset the unit by pressing the reset button on the main circuit board.

- Open the bottom plate.
- Plug in the power cord, you should hear the starting melody.
- Push the reset button on the main circuit board. One pressing will reset the FILTER replacement, and pressing and holding for 6 seconds will reset UV LAMP. If the unit is reset, you can hear a beeping sound. If the unit cannot be reset by pressing the reset button on the main circuit board, you will have to replace the main circuit board. See **6.6 REPLACE THE MAIN CIRCUIT BOARD**.

Notice: When you are trying to reset the unit **the unit has to be on**. Do not touch any parts of the circuit board or wires with your hands when you push the reset button on the main circuit board.

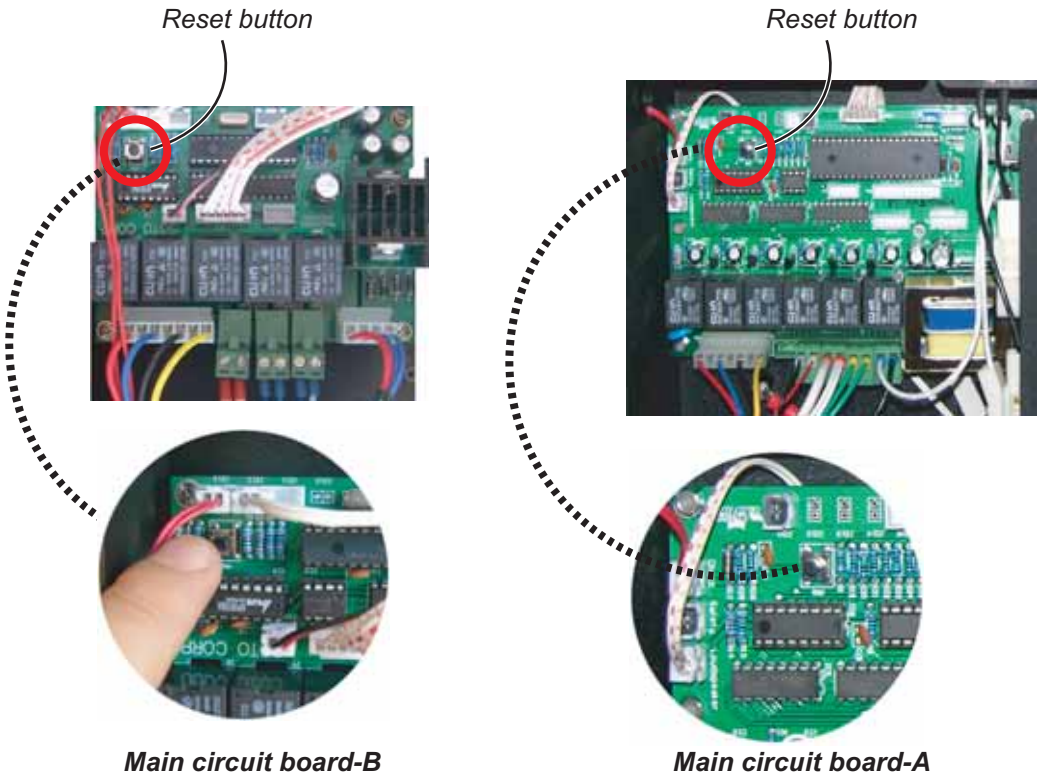


Fig. 5.7.2-3 The reset button on the main circuit board-A and -B.

An important notice:
In the new machines starting with **ser. # R200xxE**, when the activated carbon filter or UV lamp needs to be replaced the FILTER or UV LAMP indicator light will flash but the unit does not shut off automatically. Also, you just need to press the RESET1 button (for activated carbon filter) or RESET2 button (for UV lamp) 5 times continuously to reset the unit.

ENGLISH

5.8 SPARK BETWEEN HIGH VOLTAGE TERMINAL AND SCREW

A spark occurs between the unit high voltage contact terminal and screw around it.

Most of time, this problem is due to the moist air, no cell in the unit, or the high voltage power contact terminal is too close to the screws on the power contact board. If the high voltage is adjusted too high from the power supply the spark may occur (Fig. 5.8-1).

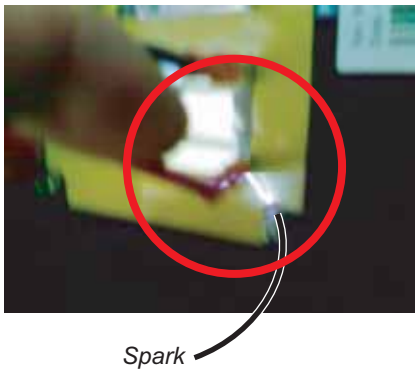


Fig.5.8-1 Sparks between the high voltage contact terminal and the screw on the power contact board.

To fix this problem, proceed with the following steps.
-Unplug the power cord.
-Open the bottom plate.
-Paste a insulation tape or clear tape beneath the unit high voltage contact terminal or use hot glue gun to bond the screws (Fig. 5.8-2).

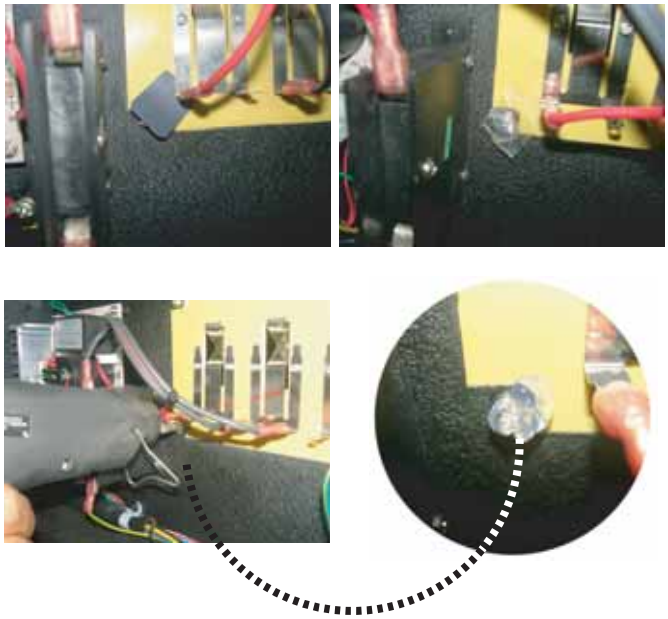


Fig.5.8-2 Paste insulation or clear tape beneath the high voltage contact power terminal or bond it with hot melt adhesive.

Required tools
1-Phillips screwdriver
2-Hot glue gun

ENGLISH

5.9 DISCHARGE SWITCH SPARK

The discharge switch sparks to the bottom plate when the unit is on, especially when there is no cell in the unit.

Most of time, this problem is because the discharge voltage wire is connected to the unit high voltage power contact terminal, sometimes causing a spark to the bottom plate, or burning of the discharge switch (Fig. 5.9-1).

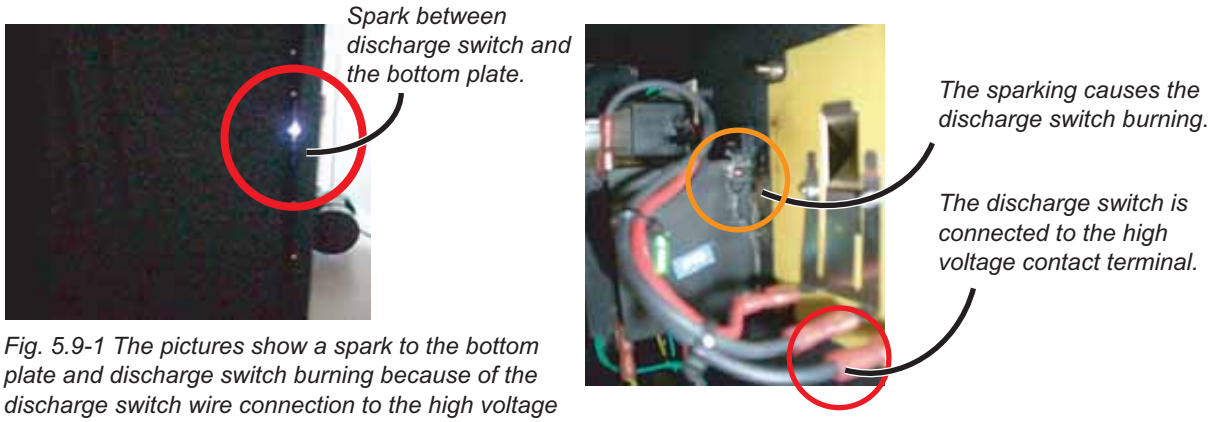


Fig. 5.9-1 The pictures show a spark to the bottom plate and discharge switch burning because of the discharge switch wire connection to the high voltage terminal.

To fix this problem, you can proceed with the following steps.
- Unplug the power cord from the electrical outlet.
- Open the bottom plate (Fig. 5.9-3).
- Discharge the unit high and low voltage contact terminals by creating a short circuit. If not, an electrical shock may occur (Fig. 5.9-4~5).
- Unplug the discharge switch black voltage wire from the high voltage contact terminal and connect it to the low voltage terminal (5.9-6~7).

Fig. 5.9-2 Required tools.
1-Phillips screwdriver
2-Flat head screwdriver

Fig. 5.9-3 Open the bottom plate. Lay down the unit horizontally on the soft mat. Unscrew the 10 screws located on the bottom of the unit with Phillips screwdriver.

Fig. 5.9-4 Create a short circuit between high voltage terminal and a screw on the bottom with screwdriver.

Fig.5.9-5 Create a short circuit between low voltage terminal and ground terminal with screwdriver.

To reduce risk of electric shock, it is extremely important to discharge the high and low voltage contact terminals before touching them.

ENGLISH

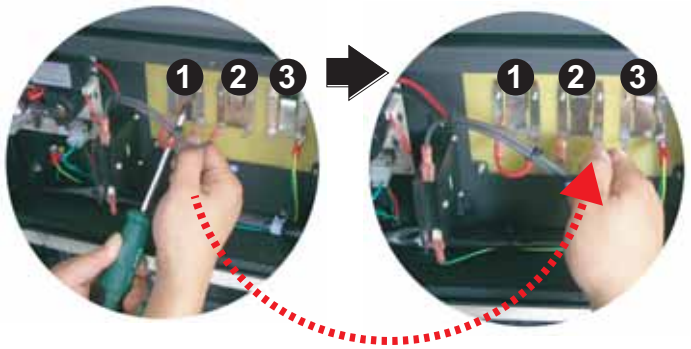


Fig. 5.9-6 Change the black discharge voltage wire from the high voltage contact terminal (1#) to the Low voltage terminal (2#) to decrease the voltage on the discharge voltage wire. It will avoid the spark from the discharge switch. After changing the wire connection, the discharge switch will discharge the collector section of the cell.

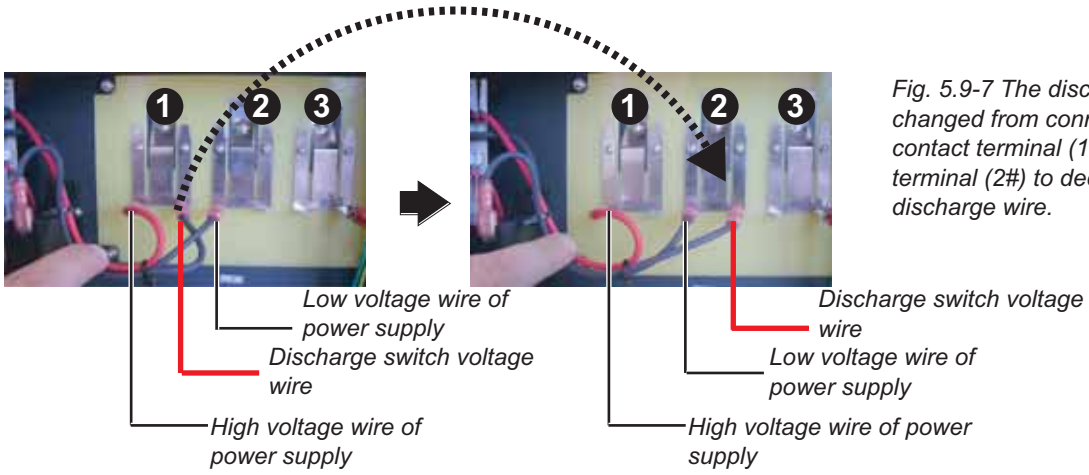


Fig. 5.9-7 The discharge black voltage wire is changed from connection with high voltage contact terminal (1#) to Low voltage contact terminal (2#) to decrease the voltage on the discharge wire.

Connect the discharge switch to the low voltage contact terminal

If the discharge voltage wire is connected to the high voltage contact terminal to discharge the ionizer section of the cell, there may occur sparking between the discharge voltage wire and the metal bottom. The reason is the voltage will reach at about 7.8KV dc in the new unit (Fig. 5.9-8. The new cell uses more powerful power supply than the old cell). When there is no cell in the unit, the voltage will increase to 10KV dc (Fig. 5.9-9). This test result shows if the discharge switch is connected to the high voltage contact terminal to discharge the ionizer section of the new cell may cause spark, especially in moist air, between the discharge switch voltage wire connection and the bottom plate. It is safer to connect the discharge switch to the low voltage contact terminal so to discharge the cell collector section (Fig. 5.9-10).

Fig. 5.9-8 The voltage on the discharge switch voltage wire is over 7.8KV when the discharge switch is connected to the high voltage contact terminal.

Fig. 5.9-9 Without the cell in the unit, the voltage of discharge switch will increase to over 10KV dc.

The discharge switch causes a spark to the bottom plate when it is connected to the high voltage contact terminal.

Fig. 5.9-10 The discharge switch voltage will decrease to 4.9KV dc when it is connected to the low voltage power contact terminal.

Notice: The high voltage power supply will automatically discharge the second stage cell after stopping the operation of the unit and unplug the cord from the outlet. Remember to stop the unit operation and unplug the power cord before touch the cell.

ENGLISH

5.10 ELECTRICAL SHOCK

Electrical shock occurs when touching the front panel.

Most of time, this problem is due to the poor contact between the cell and the front panel ground contact plate,or unit ground terminal. In order to make sure what causes this problem, you will need to proceed with the following steps.

Check the front panel ground plate

- Open the unit front panel (Air intake).
- Pull out the cell.
- Visually check if the front panel ground plate. If it is pressed down, you will need to adjust it by finger (Fig. 5.10-1).

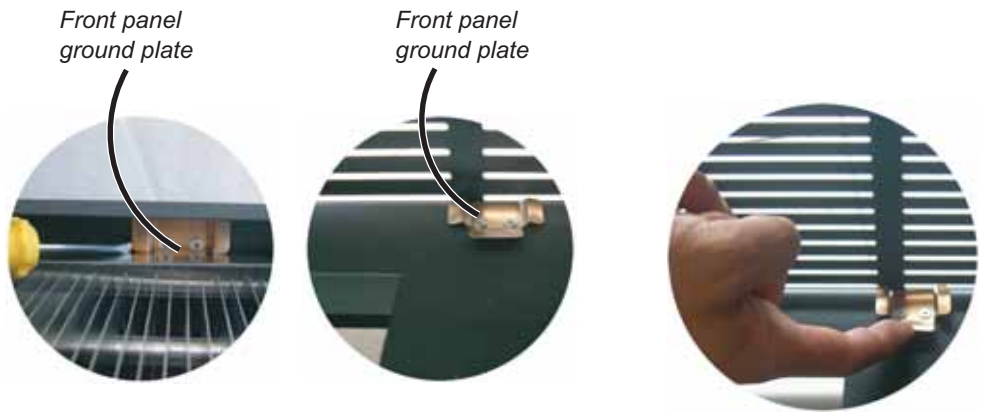


Fig. 5.10-1 Adjust the ground plate so that it can contact the cell and pre filter correctly.

Check the ground contact terminal

-Open the bottom plate.

-Visually check if the unit ground terminal contacts the cell ground terminal correctly. If not, you have to adjust the cell. If there is still electrical shock, you may consider to change the cell power contact board with the big power contact terminals. (Fig. 5.10-2~3).

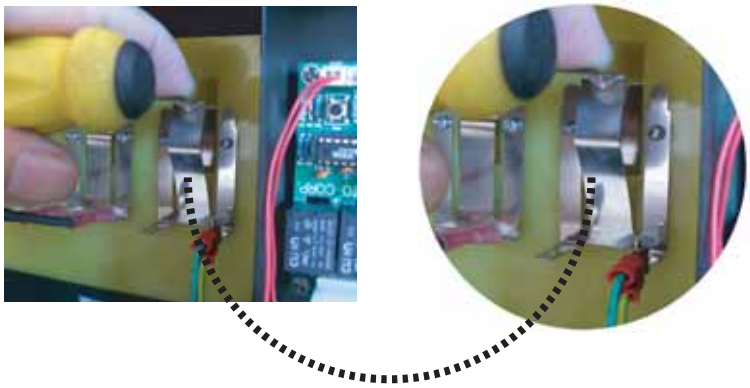


Fig. 5.10-2 Adjust the unit ground terminal so that it can contact the cell closely.

Required tools
1-Phillips screwdriver
2-Needle-nose pliers

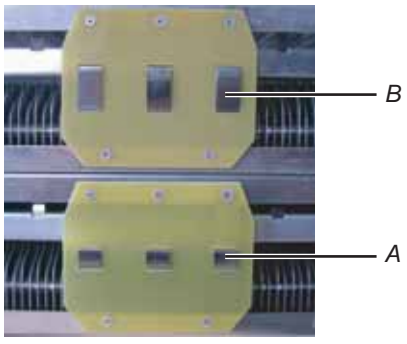


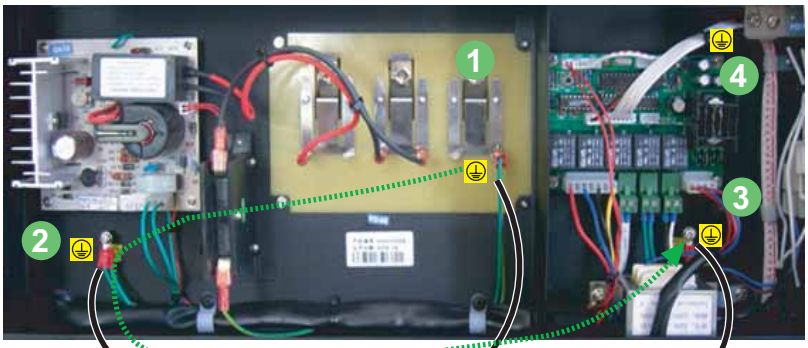
Fig. 5.10-3 Different cell power contact terminals.
A-Small terminals
B-Big terminals

ENGLISH

Unit electrical ground system

It is necessary to understand how the whole unit is grounded when you try to fix electrical system problems of the unit. When you open the bottom plate, you will see the unit ground terminal (1#), a ground screw (2#) under the power supply, another ground screw (3#) under the main circuit board and the main circuit board ground screw (4#) (Fig. 5.10-4).

1. The front panel, cell frame, pre filter and discharge switch are grounded by the unit ground terminal and through the ground wire to the ground screw 2# (Fig. 5.10-5).
2. The power supply is grounded to the ground screw 2# through its ground wire.
3. The main circuit board is grounded by its ground screw 4#.
4. The motor is grounded by ground screw 3#.
5. Finally, all the electrical parts are grounded through metal casing to the ground screw 3#, which is connected with power cord ground wire.



Bottom Ground Screw

Front panel, Pre filter, cell frame, carbon filter and discharge switch ground

Motor ground wire and power cord ground wire

WARNING

To reduce the risk of electric shock, this equipment has a grounding type plug that has a third (grounding) pin. This plug will only fit into a grounded power outlet. If the plug does not fit into the outlet, contact a qualified person to install the proper outlet. Do not alter the plug in any way.

Fig. 5.10-4 The eletrical ground system of the unit.

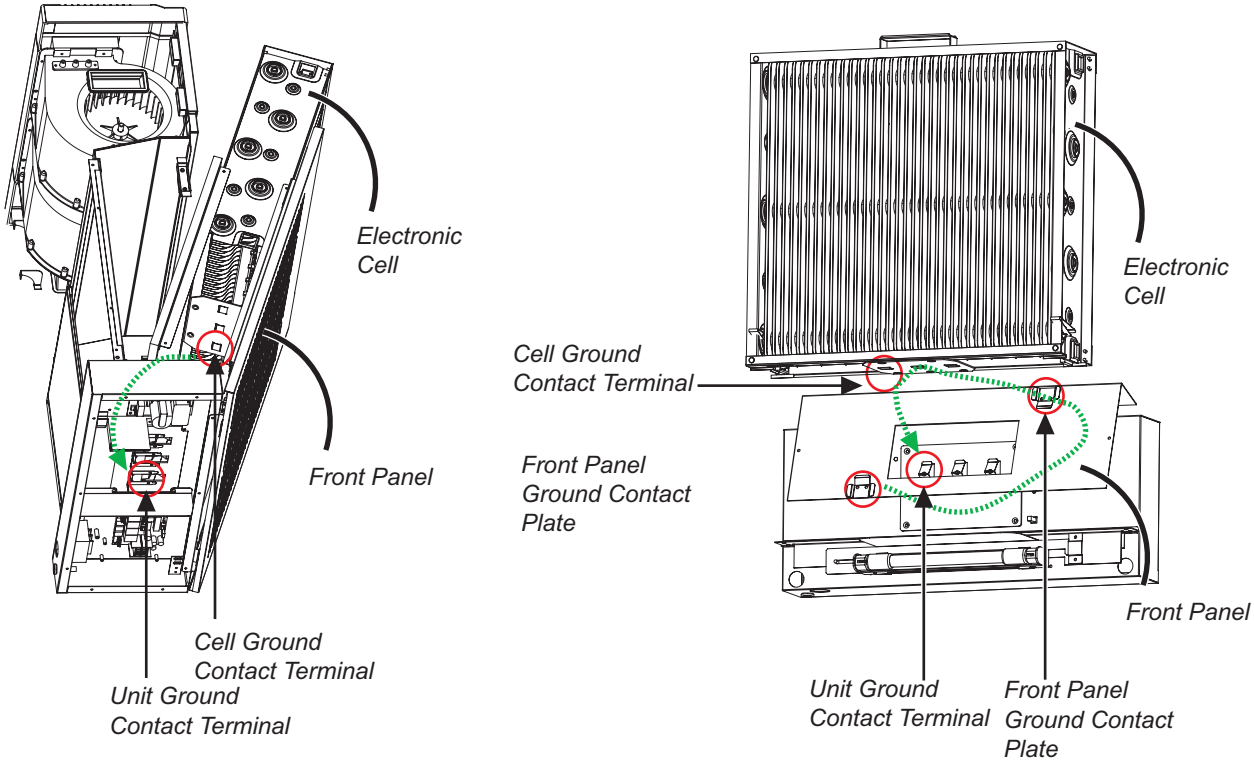


Fig. 5.10-5 The front panel is grounded through the two ground contact plates.

ENGLISH

NOTES

PART VI
HOW TO REPLACE THE PARTS

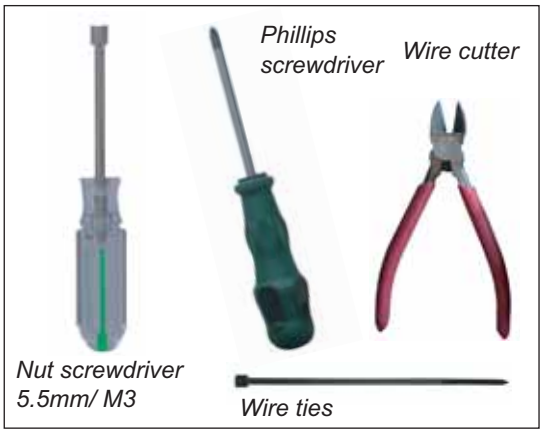
CONTENTS

RespirAide®

6.1 REPLACE THE INTERLOCK SWITCHES

When you need to change the interlock switches, proceed with the following steps for disassembly.

- Stop the operation and unplug the power plug from the electrical outlet.
- Gently, lay the unit on the work table with a soft mat not to damage the outer casing.
- Unscrew 2 screws on the interlock switch metal plate holder with a nut screwdriver (M3) and a Phillips screwdriver. If you have no nut screwdriver on your hand, you can use pliers.
- Cut down the wire ties on the interlock switch wires.
- Unplug 2 connections, one is from fuse and another is to the main circuit board. **See page 3-2.**



Required tools

1. Lay down the unit horizontally with unit bottom led facing toward you. Unscrew the 10 screws located on the bottom of the unit with Phillips screwdriver.

2. Unscrew 2 screws on the interlock switch metal holder with the nut screwdriver and the Phillips screwdriver. There are one flat washer and one spring washer beneath the nut.

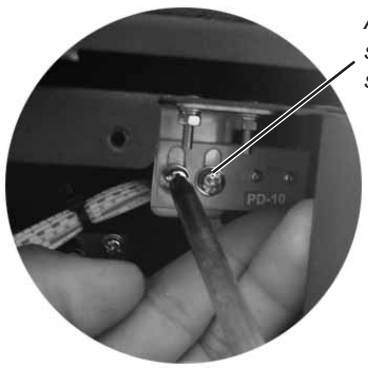
3. Cut down the wire ties on the interlock switch wires. ***Be careful not to cut the wires.***

4. Gently unplug the black wire connection to the main circuit board.

5. Unplug the white wire connection to the main circuit board.

6. Remove the interlock switch with metal plate holder.

After replacing the interlock switch, you will have to check if the levers are pushed down correctly by the front panel. You can adjust the lever height by fastening the 2 screws.



Adjust the interlock switch with these 2 screws.

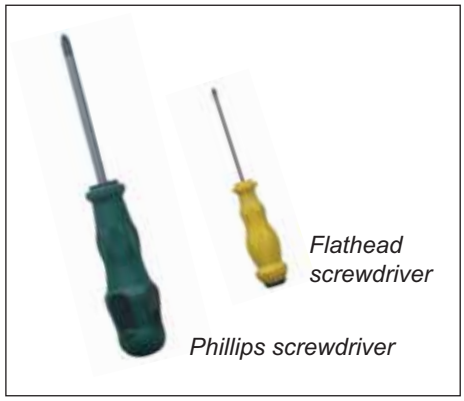
When you replace the new interlock switch, simply do the reverse operation. Make sure each connection is connected correctly.

ENGLISH

6.2 REPLACE UV LAMP AND UV LAMP HOLDER (BALLAST)

When you replace the UV lamp or ballast, proceed with the following steps.

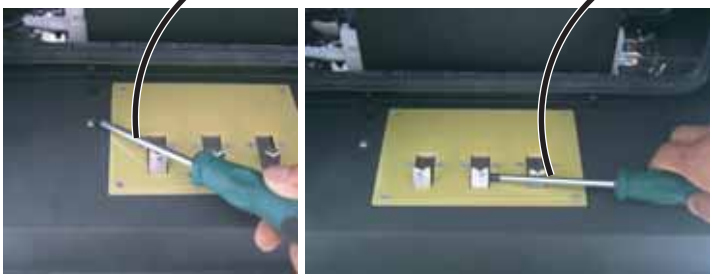
- Unplug the unit power cord after stopping the operation.
- Take off the front panel (Air intake).
- ***Discharge the unit high and low voltage contact terminals by creating a short circuit. If not, an electrical shock may occur (See the below picture).***
- Open the swing nut on the UV light blocker. For Some units, you need to open 2 screws located on each side of the UV light blocker.
- Remove the UV light blocker.
- Unplug the UV lamp cord, it is similar to many electrical cords on household appliances.
- Lift up the UV lamp holder (Ballast) by a screwdriver.



Required tools

Create a short circuit between high voltage terminal and a screw on the bottom with screwdriver.

Create a short circuit between low voltage terminal and ground terminal with screwdriver.



Replacing the UV lamp

Open the swing nut at the right side of the UV light blocker and remove the UV light blocker.

1. Unplug the rubber column at each side of UV lamp holder. Remove the sticker paper from the side of UV lamp holder.

2. Hold each side of the UV lamp and gently rotate until it unlocks from the socket. Pull the pins out the sides of the socket, one end at a time.

Replacing the UV lamp holder (Ballast)

1. Unplug the UV light cord from the left side of the UV lamp holder.

2. Lift up the UV lamp holder with a screwdriver to remove it easily.

3. Pull out the UV lamp holder from the 2 metal clips.

ENGLISH

6.3 REPLACE THE POWER SUPPLY

When you need to replace the high voltage power supply, proceed with the following steps.

- Stop the operation and unplug the power plug from the electrical outlet.
- Open the bottom plate.
- ***Discharge the unit high and low voltage contact terminals by creating a short circuit. If not, an electrical shock may occur (See the below picture).***
- Unplug power supply cord and signal wire connections.
- Cut down the 2 wire ties on the power supply wires.
- Unplug the connections to the unit power contact terminal.
- Cut down the wire ties on the ground wire.
- Unscrew the ground screw.
- Unscrew 4 screws on the power supply circuit board.

Flathead screwdriver *Wire cutter* *Phillips screwdriver*

Required tools

Create a short circuit between high voltage terminal and a screw on the bottom with screwdriver.

Create a short circuit between low voltage terminal and ground terminal with screwdriver.

WARNING

To reduce risk of electric shock, it is extremely important to discharge the high and low voltage contact terminals before touching them.

1. Lay down the unit horizontally with unit bottom led facing toward you. Unscrew the 10 screws located on the bottom of the unit with Phillips screwdriver.

Green and black color wires

2. Unplug the power supply cord connection. When disconnecting this connection, place a flathead screwdriver beneath the tab and gently lift it up as you pull out the connection. Do not gripe the wires when you unplug the connection.

3. Gently unplug the power supply signal wires. Hold the connection as you unplug the connection.

4. Cut down the wire ties on the power supply wires. Be careful not to cut the wires.

5. Unplug the red and black power supply wire connections from the unit power contact terminals.

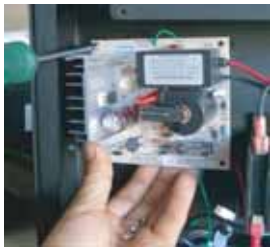
ENGLISH

6. Cut down the wire ties on the unit ground terminal wire. Be careful not to cut the wires.

7. Cut down the wire ties on the power supply ground wire. Be careful not to cut the wires.

8. Unscrew the screw on the unit ground terminal wire. There are flat and spring washers on it.

Flat and spring washer



9. Unscrew 4 screws on the power supply circuit board. When opening the last screw, hold the circuit board to avoid dropping down.

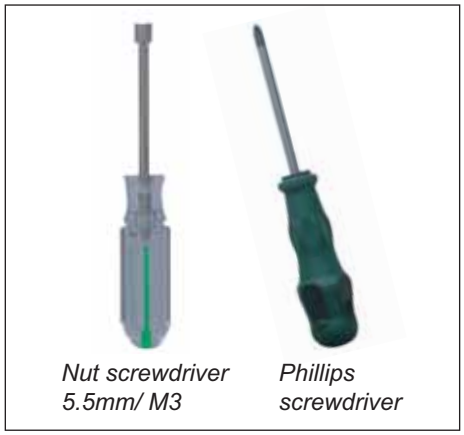
When you replace the new power supply, simply do the reverse operation. Make sure each connection is connected correctly.

ENGLISH

6.4 REPLACE THE POWER COTACT BOARD

If you have to replace the unit epoxy resin power contact board, you can follow the below steps.

- Stop the operation and unplug the power plug from the electrical outlet.
- Open the bottom plate.
- ***Discharge the unit high and low voltage contact terminals by creating a short circuit. If not, an electrical shock may occur (See the below picture).***
- Unplug the high and low and voltage wire connections of the power supply. Disconnect the discharge voltage wire connection.
- Open screws on the power contact board.



Nut screwdriver 5.5mm/ M3 *Phillips screwdriver*

Required tools

Lay down the unit horizontally with unit bottom led facing toward you. Unscrew the 10 screws located on the bottom of the unit with Phillips screwdriver.

To reduce risk of electric shock, it is extremely important to discharge the high and low voltage contact terminals before touching them.

Create a short circuit between high voltage terminal and a screw on the bottom with screwdriver.

Create a short circuit between low voltage terminal and ground terminal with screwdriver.

1. Unplug the red high voltage wire connection of the power supply, pushing down the terminal with screwdriver.

2. Unplug the black low voltage wire connection of the power supply.

3. Unplug the black voltage wire connection of the discharge switch.

4. Open 2 nuts at the left side of the board with Phillips and nut screwdriver.

There are flat and spring washers beneath the nut.

ENGLISH

5. Open the screws at the right side of the board with Phillips screwdriver. You need to hold the circuit board protector plate as you open the screws.

6. Open the nut on the ground terminal to remove ground wires with nut screwdriver.

When you change the epoxy resin power contact board, simply do the reverse operation. Make sure the board is secured outside the bottom.

ENGLISH

6.5 REPLACE THE DISCHARGE SWITCH

When you replace the discharge switch, proceed with the following steps.
- Stop the operation and unplug the power plug from the electrical outlet.
- Open the bottom plate.
- Discharge the unit high and low voltage contact terminals by creating a short circuit. If not, an electrical shock may occur (See the below picture).
- Unplug the black voltage wire from the discharge switch.
- Unplug the ground wire from the discharge switch.
- Open the screw in side the unit.
- Push down the switch as you pull out the discharge switch.

Phillips screwdriver

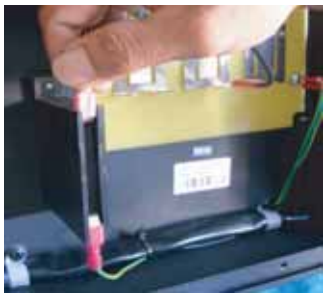
Required tools

Create a short circuit between high voltage terminal and a screw on the bottom with screwdriver.

Create a short circuit between low voltage terminal and ground terminal with screwdriver.

To reduce risk of electric shock, it is extremely important to discharge the high and low voltage contact terminals before touching them.

1. Lay down the unit horizontally with unit bottom led facing toward you. Unscrew the 10 screws located on the bottom of the unit with Phillips screwdriver.



2. Unplug the black voltage wire connection. Do not hold the wire when you unplug the wire connection.

3. Unplug the ground wire connection. Hold the connection tightly when you disconnect the connection.

4. Open the screw located on the discharge switch inside the unit. In some units, there are 2 screws on it.

5. Push down the switch as you pull out it from the bottom.

When you change the discharge switch, simply do the reverse operation. Make sure each connection is connected tightly.

ENGLISH

6.6 REPLACE THE MAIN CIRCUIT BOARD

When you prepare to change the main circuit board, you should proceed with the following steps

- Stop the operation and unplug the power plug from the electrical outlet.
- Open the bottom plate.
- ***Discharge the unit high and low voltage contact terminals by creating a short circuit. If not, an electrical shock may occur (See the below picture).***
- Disconnect 9 wire connections to the main circuit board.
- Open the fuse socket on the back of the unit with a flathead screwdriver.
- Unscrew 4 screws on the main circuit board.

Phillips screwdriver

Required tools

Lay down the unit horizontally with unit bottom led facing toward you. Unscrew the 10 screws located on the bottom of the unit with Phillips screwdriver.

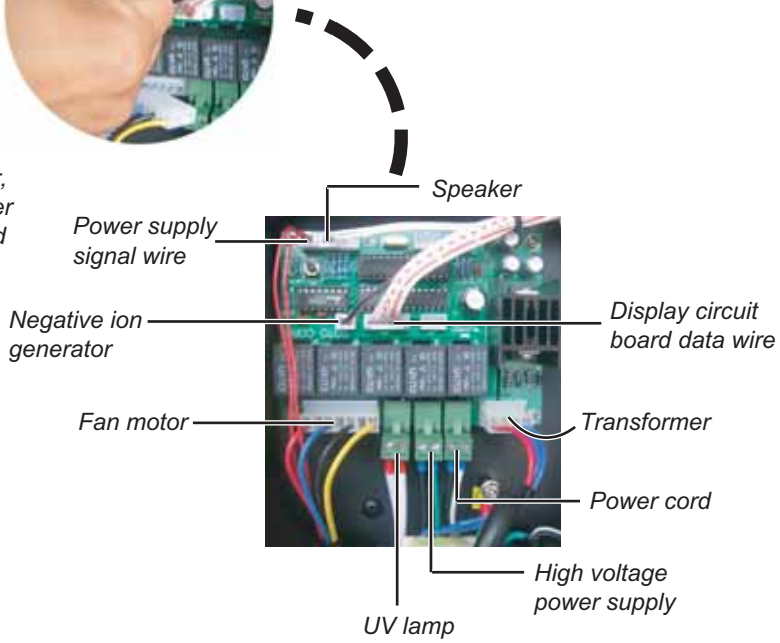
WARNING

To reduce risk of electric shock, it is extremely important to discharge the high and low voltage contact terminals before touching them.

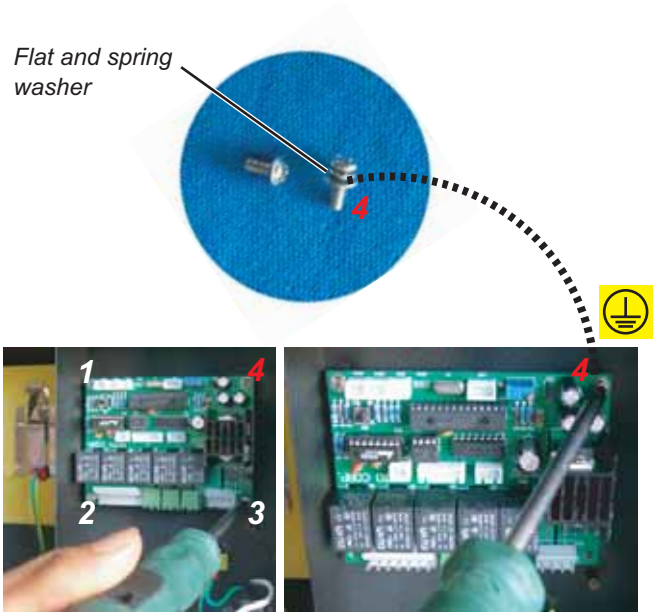
Create a short circuit between high voltage terminal and a screw on the bottom with screwdriver.

Create a short circuit between low voltage terminal and ground terminal with screwdriver.

1.Gently, unplug 9 connections- transformer, fan motor, power cord, high voltage power supply, UV lamp, power supply signal wire, speaker, negative ion generator and display circuit board wire connections.



ENGLISH



2. Unscrew 4 screws on the main circuit board.
Note: The 4th is for the main board circuit board ground, it is different from other screws with flat and spring washer.

When you replace a new main circuit board, simply do the reverse operation. Make sure the board ground is tightly secured.

6.7 REPLACE THE FAN MOTOR

The following steps are discussing how to replace the fan motor. However, you also use this procedure when you need to replace other parts, including motor capacitor, negative ion generator, speaker, odor sensor, remote receiver, or display circuit boards.
Make sure to stop the operation and unplug the power plug from the electrical outlet before you follow the below steps.

Required tools

Step 1. Remove the unit upper cover and fan motor front cover.

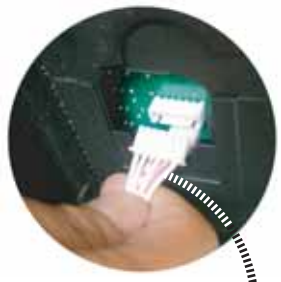
1. Take off the front panel and unscrew 4 screws with Phillips screwdriver. Hold the upper cover when you unscrew the last screw to avoid dropping down. After unscrewing 4 screws, pull it down with two hands. In some units, there are 2 screws on the upper cover.

2. Open the screws on the fan motor front cover. After removing the fan motor front cover, you can see the fan motor system.

Step 2. Unplug the fan motor and negative ion generator connection.

1. Push down the tab on the connection and unplug the motor connection.

2. Unplug the negative ion generator connection.

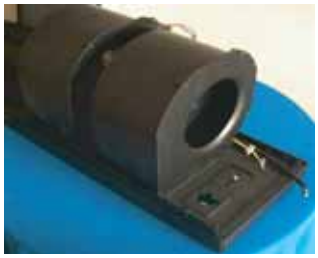


Step 3. Unscrew the motor ground screw and disconnect the display wire connection.

1.Lift the fan motor unit and unscrew the motor ground screw.

2. The new machines will have the display circuit board cover. Open the screw on the cover to unplug the display circuit board wire (Main circuit board data wire) after removing the wire rubber harness protector.

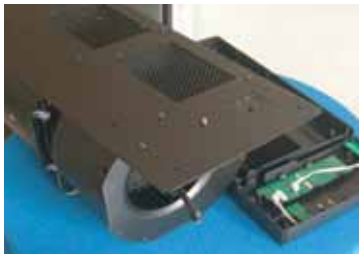
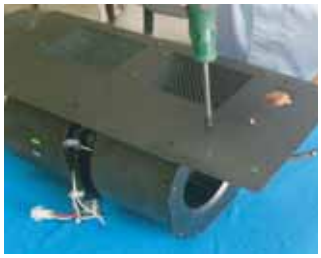
Step 4. Remove the plastic cover

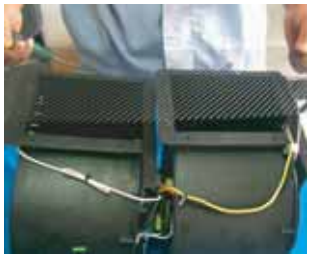
1. After opening 3 screws from the back of the unit, you can take out the fan motor unit.


2. Open 10 screws on the plastic cover, 6 screws for plastic top cover and 4 for control panel cover.

Step 5. Remove the fan motor upper plate and metal mesh

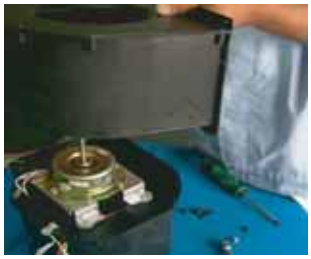
1. Open 8 screws on the fan motor upper plate to separate the fan motor.



2. Remove the metal mesh beneath the fan motor upper plate.

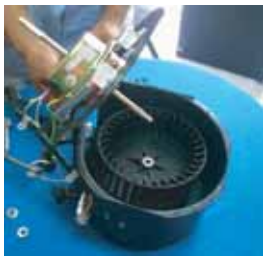
Step 6. Remove the motor



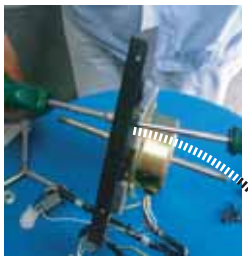


*1. Open a nut on the motor sheft with a nut screwdriver, **counter clock wise** with the right side nut.*

2. Open 2 screws on the motor wires.

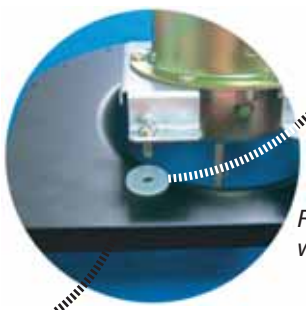
*3. Open another nut on the motor sheft with a socket wrench, **clock wise** with the left side nut.*



4. Open screws on the fan motor side plate with Phillips and nut screwdriver.

When you replace the fan motor, simply do the reverse operation. Make sure all the washers are installed.

Spring and flat washer

Rubber washer

ENGLISH

6.8 REPLACE THE FAN MOTOR CAPACITOR

When you try to replace the motor capacitor, proceed with the following steps.

- Open the fan motor front cover.
- Follow step 1 procedure of REPLACE FAN MOTOR.
- Unscrew the screw on the motor capacitor.
- Unplug the capacitor wire connection with a needle-nose pliers.
- The capacitor is rating for 6uf, 250V ac.

Required tools

1. Open the screw on the motor capacitor.

2. Unplug the capacitor wire connection with a long-nose pliers.

ENGLISH

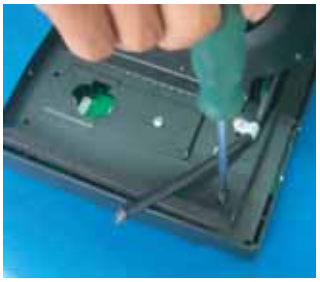
6.9 REPLACE THE DISPLAY CIRCUIT BOARD, ODOR SENSOR, REMOTE RECEIVER.

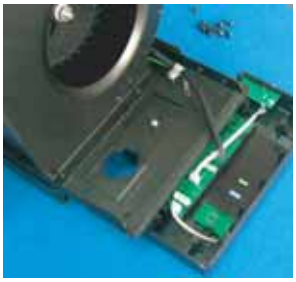
When you try to replace the display circuit board, odor sensor or remote receiver, you should proceed with the following steps.

-Stop the operation and unplug the power plug from the electrical outlet.
- Follow Step1~4 procedures of REPLACE FAN MOTOR.
- Unscrew 4 screws on the fan motor top cover (Plastic control cover).
- Remove odor sensor circuit board.
- Remove the remote receiver.
- Pull out the display circuit board.

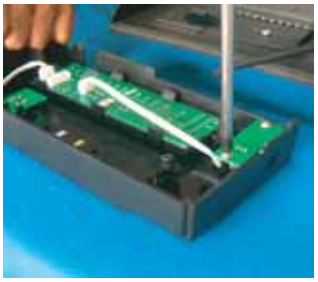
Required tools

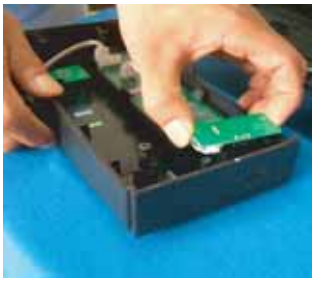
Replace the odor sensor





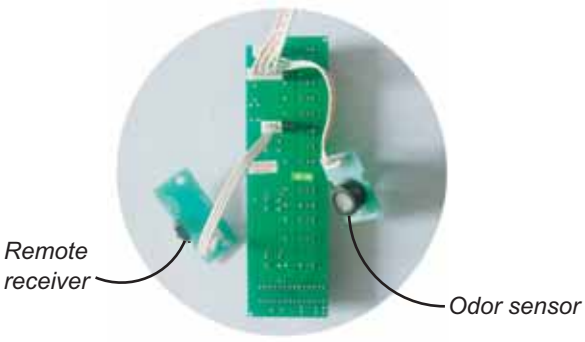
1. Open 4 screws on the plastic control cover.





2. Remove 2 screws on the odor sensor and pull it out from the plastic control cover.

3. Unplug the odor sensor wire connection from the display circuit board.



Replace the remote receiver

1. Gently, lift up the remote receiver circuit board with a screwdriver.

2. Unplug the wire connection from the display circuit board.

Replace the display circuit board

Gently, unplug the display circuit board from the plastic control cover.

When you replace the display circuit board, odor sensor or remote receiver, do the reverse operation.

ENGLISH

6.10 REPLACE THE POWER CORD

When you need to change the electrical power cord, you can proceed with the following steps.

- Stop the operation and unplug the power plug from the electrical outlet.
- Open the bottom plate.
- Unplug white Live line and black Neutral wire connections from the interlock switch wire connections.
- Unscrew the screw on the ground wire connection.
- Unscrew the screw on the power cord.
- Remove the strain relief bushing (power cord holder).
- Pull out the power cord wires.

Phillips screwdriver *Needle-nose pliers*

Required tools

1. Lay down the unit horizontally with unit bottom led facing toward you. Unscrew the 10 screws located on the bottom of the unit with Phillips screwdriver.

2. Unplug the black wire (Neutral wire) connection from the interlock switch.

3. Unplug the white wire (Live line) connection from the interlock switch.

4. Open the screw on the ground wires.

5. Unscrew the screw on the power cord wires. ***Note: The power cord wire is under the motor ground wire.***

6. Grip the power cord holder with needle nose pliers and pull out the power cord at the same time.

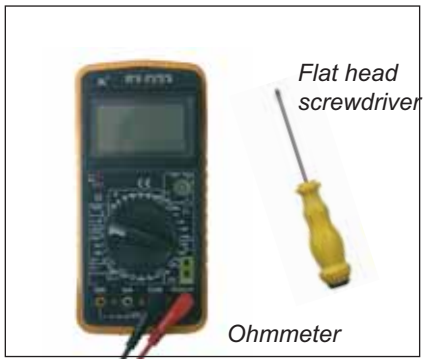
7. Pull out the power cord.

When you replace the electrical power cord, simply do the reverse operation.

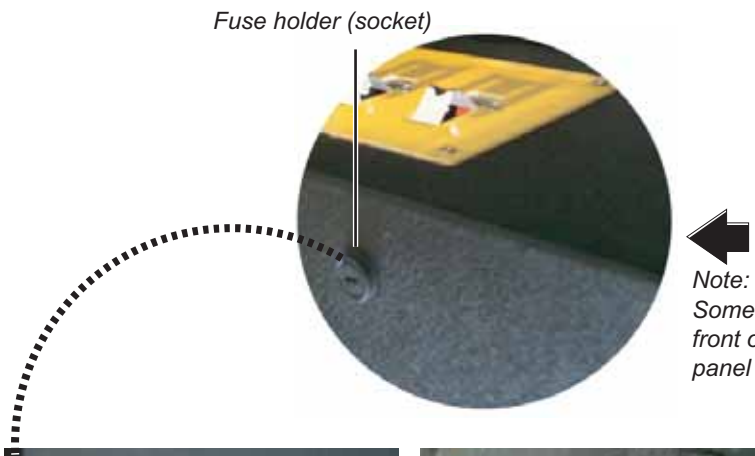
ENGLISH

6.11 REPLACE THE FUSE

If you need to replace the fuse, proceed with the following steps.
- Stop the operation and unplug the power plug from the electrical outlet.
- Open the fuse socket on the back of the unit with a flathead screwdriver.
- Take out the damaged fuse and replace it with a new one. For more information, see page 5-3.



Required tools



Note:
Some units have the fuse holder at the bottom front of the unit, you have to take off the front panel to find the fuse holder.

1. Put the unit on the work table with a carpet mat so not to damage the outer casing.

2. Open the fuse holder cover with a flathead screwdriver. Gently, press down and rotate it until it spring out.

3.Take out the fuse with plastic cover and check the fuse. The fuse is rating for 125V, 2A.

ENGLISH

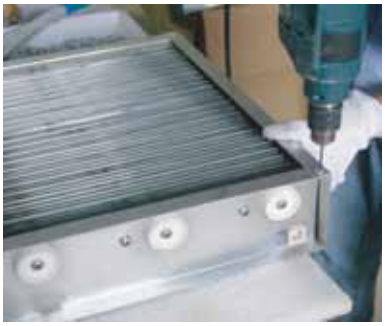
6.12 REPLACE THE CERAMIC INSULATORS

When you try to replace the ceramic insulators by yourself, proceed with the following steps.

- Stop the operation and unplug the power plug from the electrical outlet.
- Open the front panel and pull out the cell.
- Lay the cell on the soft mat.
- Remove rivets on the top or bottom plate of the cell.
- Loose the screw on the side plate.
- Replace the damaged square shape ceramic insulator.
- Close the top or bottom plate.

Required tools

Replace the square shape ceramic insulator



1. Remove 4 rivets on the front and back of the cell with a hammer drill.

2. Open the top or bottom plate of the cell.

3. Loose the screw on the one side and pull out the damaged square shape ceramic insulator.

4. Replace the new ceramic insulator.

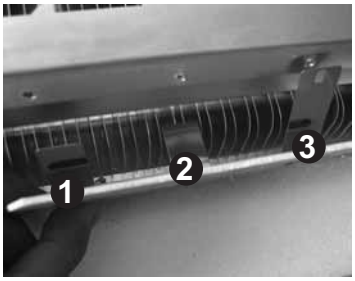
5. Fasten the 2 screws on each side of the side plate with 2 Phillips screwdrivers.

6. Prepare a rivet gun and 4 rivets (3.2x7). Close the top or bottom plate of the cell and connect it to the side plate by rivets.

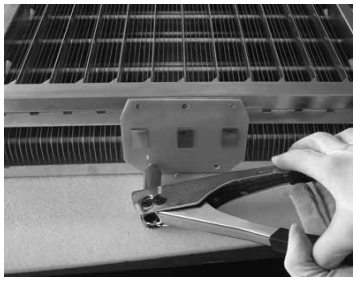
ENGLISH

Replace the power contact board

1.Remove 5 rivets on the epoxy resin power contact board with a hammer drill.



2. Replace a new power contact board. Remember the ground terminal is placed between the board and cell bottom plate.
1-High voltage terminal, 2- Low voltage terminal, 3- Ground terminal



3. Fasten 5 rivets (3.2x7) on the power contact board with rivet gun.

Needle-nose pliers

Required tools

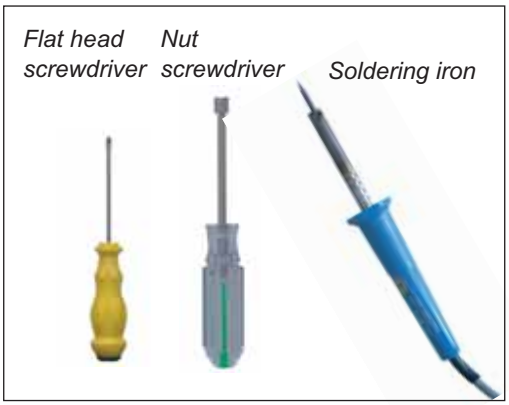
Replace an ionizer wire

Install new ionizer wire by hooking eyelets over spring connectors with needle-nose pliers. Two eyelets hold an ionizer wire to cell.

ENGLISH

6.13 REPLACE THE SPEAKER

When you try to replace speaker, you can proceed with the following steps.
- Stop the operation and unplug the power plug from the electrical outlet.
- Remove the unit left side handle below the plastic control panel cover.
- Pull out the speaker.
- Remove the wire from speaker using a soldering iron.
- Replace a new speaker and solder the wires to the speaker.
-Install the unit handle.



Required tools

1. Gently, lift up the corner of the handle with the flat head screwdriver.

2. Pull out the handle.

3. Take out the speaker from the handle hole.

4. Remove the wires from the speaker with soldering iron.

5. Attach the wires to the new speaker with soldering iron.

For new units, the speaker is secured to the side of the unit casing with a nut, you will need to open the unit upper cover and fan motor front plate to find the speaker. You can follow **Step1** of **6.7 REPLACE THE FAN MOTOR**.

ENGLISH

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